

THE TYPE SPECIMENS AND IDENTITY OF THE
SPECIES DESCRIBED IN THE GENUS *LITHOBIUS*
BY C. L. KOCH AND L. KOCH FROM 1841 TO 1878
(CHILOPODA : LITHOBIOMORPHA)



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THE TYPE SPECIMENS AND IDENTITY OF THE SPECIES DESCRIBED IN THE GENUS *LITHOBIUS* BY C. L. KOCH AND L. KOCH FROM 1841 TO 1887 (CHILOPODA : LITHOBIOMORPHA)

By E. H. EASON

INTRODUCTION

CARL LUDWIG KOCH (C. L. Koch) described fifteen nominal species of *Lithobius*. His son, Dr. Ludwig Carl Christian Koch (L. Koch) redescribed most of his father's species and described thirty-two more and one variety. Subsequent authors have placed various interpretations on L. Koch's work, Latzel (1880) and Haase (1880) giving the earliest detailed and accurate accounts of what they considered to be the Kochs' western European species. These two authors, who were in correspondence with L. Koch and had access to some of his material, are in general agreement with one another and Latzel is universally recognized as the first authoritative reviser of both C. L. Koch's and L. Koch's species, although he dealt only with those found in the Austro-Hungarian Monarchy. But in spite of Latzel's and Haase's work there is still uncertainty as to the identity of some of these species whereas most of those originally described by L. Koch from Greece and from Tinos in the Aegean Archipelago have never been revised and their identity has not hitherto been established.

Carl Koch gave a very brief account of the Koch Collection of Arachnida and Myriapoda (C. Koch, 1910) but he did not mention any species by name and merely enumerated those of each class attributable to C. L. Koch and to L. Koch. I have recently been able to examine the specimens of *Lithobius* in this Collection, the bulk of which is preserved in the British Museum (Natural History) and the remainder in the Zoological Museum, Berlin. It includes the original material of two of C. L. Koch's and twenty-three of L. Koch's species together with the specimens of ten of C. L. Koch's on which L. Koch seems to have based his redescriptions. The type specimens and identity of *L. grossipes* C. L. Koch and *L. litoralis* L. Koch have been discussed in a previous publication (Eason, 1970a) and in the present paper an attempt is made to determine the identity of the other species.

SPECIES DESCRIBED BY C. L. KOCH

The original descriptions of these species (1841, 1844, 1847) are very inadequate by modern standards, relying to a large extent on details of colour and other superficial features and omitting many of the characters now recognized as of taxonomic importance. Although habitat is mentioned, type localities are indefinite. In a later publication (C. L. Koch, 1863) amplified descriptions, coloured plates and line drawings are provided but in only a few cases are they of any real value. L. Koch

(1862) was the first to redescribe these species more adequately and it is reasonable to assume that he interpreted most of his father's original descriptions correctly.

According to C. Koch (1910) only a small minority of C. L. Koch's species of Myriapoda are represented in the Koch Collection by type specimens and L. Koch did not use the original material of his father's species of *Lithobius* for many of his redescrptions. Only *L. grossipes* and *L. melanocephalus* seem to have been redescrbed from type specimens, both of which are present in the Collection. Of the other species, eleven were almost certainly redescrbed from specimens L. Koch either collected himself, mostly from Nuremberg and the surrounding Franconian Jura, or had sent him by other collectors: all these specimens except those of *L. impressus* are present in the Collection. The remaining species, *L. glabratus* and *L. varius*, were unknown to L. Koch.

The original material belonging to all but two of C. L. Koch's species had probably already been either lost or badly damaged before 1862. The fact that C. L. Koch's later descriptions and illustrations did not appear until 1863 is no evidence of the continued existence of these specimens; the author died in 1857 so his book must have been compiled from earlier work and suffered delay in publication. It is therefore necessary to select neotypes from L. Koch's material for six of C. L. Koch's species whose identity needs to be established in order to ensure stability of nomenclature.

SPECIES DESCRIBED BY L. KOCH

The original descriptions of most of these species (1862, 1867, 1878) are fairly adequate. The number of antennal articles, prosternal teeth, coxal pores, tergal projections, and ventral spines on the fifteenth legs are all recorded, the ocelli are figured in many cases and the female gonopods are described where females were available. A notable omission, however, is any mention of coxolateral spines (VaC) or accessory apical claws on the fifteenth legs. Fairly definite type localities are given for most of the species but type specimens are not designated.

Of the twenty-three species and one variety represented by original material in the Koch Collection, eight were based on single specimens (holotypes) and sixteen on more than one specimen (syntypes): it is necessary to select lectotypes from only seven of the latter in order to ensure stability of nomenclature. Three further species are represented in the Collection by specimens apparently identified by L. Koch but which do not seem to belong to the original material. Two of these together with a further six which are not represented were all originally described from borrowed specimens which may never have formed part of the Collection. The chief source of these specimens was the collection of Graf von Keyserling of Munich. Part of the latter, consisting largely of insects, has been acquired by the British Museum (Natural History) but all attempts to trace the specimens of *Lithobius* both here and in the principal museums of Germany and Austria have failed.

METHODS

All the species described in the genus *Lithobius* by C. L. Koch and L. Koch are recorded in order of their dates of publication whether or not there is any material available for examination. Where more than one description applying to the

same zoological species occurs in the same work, whichever name Latzel (1880), their first reviser, believed to attach to the best description is regarded as having priority even though it may appear on a later page (Code, article 24a).

All the specimens in the Koch Collection labelled with the name of a species of *Lithobius* originally described either by C. L. Koch or L. Koch have been examined. They are all preserved in spirit, each tube of specimens containing labels bearing the identity, usually the locality and sometimes the habitat and name of the collector. The labels belonging to the specimens in the Zoological Museum, Berlin have all been rewritten but at least one label in each of the tubes in the British Museum (Natural History) appears to be in L. Koch's hand.

In some instances L. Koch placed specimens of different species bearing a superficial resemblance to one another under the same name. Although he made relatively few mistakes over males which usually have the most characteristic features, he had difficulty in identifying females of similar species. For example, he failed altogether to recognize females of *L. muticus* C. L. Koch, placing nearly all of them with *L. mutabilis* L. Koch and identifying as *L. muticus* females of *L. pelidnus* Haase. On the other hand he never placed widely different stadia of the same species together and regarded many of them as taxonomically distinct. In the present study each specimen is recorded under the name given it by L. Koch but those he misdetermined are also given their correct identity and placed in separate tubes, retaining their original registered numbers. All labels are recorded exactly as written by Koch. Where they have been rewritten by some recent museum worker this is indicated: where they are difficult to interpret extra words of explanation are inserted and enclosed in square brackets. Descriptions of specimens are only given when some special feature or aberration requires emphasis, or when an adequate account of the species in question is not to be found in the literature; otherwise reference is made to a published description. When it is necessary to refer to an immature post-larval stadium, Verhoeff's (1905) terms are used for the larger species such as *L. forficatus* in which the life-history is well-known, but for the smaller species to which Verhoeff's terms cannot be strictly applied, the specimen are allotted to stadia corresponding to those described for *L. variegatus* Leach (Eason, 1964).

Selected neotypes and lectotypes are labelled as such and placed in separate tubes. Selection of the former presents no difficulty but some of the syntypical series of L. Koch's species for which lectotypes are selected consist of specimens belonging to more than one zoological species; here a lectotype is selected from the specimens answering most closely to the original description of the species in question, or where there is nothing to choose between them in this respect, from those belonging to the zoological species to which it is desirable to attach Koch's name in order to cause the least confusion in current nomenclature. The originally published type localities of most of C. L. Koch's and many of L. Koch's species are vague or equivocal: in these cases the designate type locality is that of the type specimen.

Conclusions as to the status and present generic classification of all the species described by C. L. Koch and L. Koch in the genus *Lithobius* together with their published and designate type localities, are summarised in Table 1.

1. *Lithobius impressus* C. L. Koch

Lithobius impressus C. L. Koch, 1841 : 224. 1863, 1 : 115, fig. 105a, b & c. L. Koch, 1862 : 36, fig. 7a & b.

TYPE LOCALITY. Algerian coast.

MATERIAL EXAMINED. "L. impressus [rewritten]" "Corsica, [leg.] E. Simon" B.M.(N.H.) Reg. no. 13.6.18.326-340. Fifteen specimens which answer to the original description of *Lithobius impressus corsicus* Léger and Duboscq, 1903.

REMARKS. Since the type locality is Algeria and L. Koch's description was based on specimens from Algiers and Oran borrowed from the Kyeserling Collection, none of the above specimens from Corsica can be selected as neotype. L. Koch must have identified them after finishing his book without attaching any significance to the hooked spine (DpP) on the 14th male prefemur which is characteristic of subsp. *corsicus* (Léger & Duboscq, 1903: 316, fig. 1) but never found in the North African form.

Silvestri (1897) regarded *L. nudicornis* Gervais as the correct name for this species but most authors reject *nudicornis* which was described very scantily from a Sicilian specimen (Gervais, 1837). On the other hand *impressus* is also rejected by many authors in favour of *L. elongatus* Newport which was published some years later (Newport in Lucas, 1849). However, quite apart from the fact that *impressus* takes precedence over *elongatus* there are good reasons for supposing that these names apply to two distinct subspecies (Eason, 1971) and the valid name for the common Algerian form, which belongs to the genus *Eupolybothrus* Verhoeff and the subgenus *Allopolybothrus* Verhoeff as emended by Jeekel (1967), is *Eupolybothrus (Allopolybothrus) impressus impressus* (C. L. Koch).

2. *Lithobius dentatus* C. L. Koch

Lithobius dentatus C. L. Koch, 1844 : 22, fig. 22. 1847 : 148. 1863, 1 : 117, fig. 106a, b & c. L. Koch, 1862 : 54, fig. 18.

TYPE LOCALITY. Germany.

MATERIAL EXAMINED. "Lithobius dentatus C. L. Koch, Nürnberg, leg. L. Koch [rewritten]" Zool.Mus.Berlin: Kat.Nr.333. A male and a female, both mutilated.

"Lithobius dentatus C.K." "Eichstaedt, Happurg, Nürnberg" B.M.(N.H.) Reg. no. 13.6.18.130-136. Six more or less mutilated specimens.

"Lithobius dentatus C.K." "Kärnthen [Carinthia, Austria]" B.M.[N.H.] Reg. no. 13.6.18.137. Two males and a female in fair condition.

"Lithobius dentatus C.K." "Meran [Merano, Italy], [leg.] Milde" B.M.(N.H.) Reg. no. 13.6.18.138. A mutilated male.

TYPE SPECIMEN. The best preserved specimen from Germany, a male 12 mm long answering to Latzel's (1880 : 81) description of *L. dentatus* var. *alpestris*, is here formally designated as the neotype (B.M.(N.H.) 13.6.18.135). Of the localities given for this specimen, Happurg is 25 km. from Nuremberg and Eichstätt (= Eich-

staedt) is only 60 km. distant, so the designate type locality may be given as "Nuremberg district".

REMARKS. Since neither C. L. Koch nor L. Koch mentioned the dorsal sulci on the 14th and 15th male tibiae, Latzel believed he had discovered a new variety characterized by these sulci which he called *alpestris*. However, the tibial sulci are quite distinct in the neotype and in the only other males in the Collection with the 14th and 15th legs intact; they were also noted by Haase (1880 : 24) as characteristic of the species so it is clear that they were merely overlooked by the Kochs and var. *alpestris* should be disregarded.

3. *Lithobius calcaratus* C. L. Koch

Lithobius calcaratus C. L. Koch, 1844 : 23, fig. 23. 1863, 2 : 45, fig. 168 a & b. L. Koch, 1862 : 70, fig. 30.

TYPE LOCALITY. Germany.

MATERIAL EXAMINED. "Lithobius calcaratus C. L. Koch, Franconia (Jura), leg. L. Koch [rewritten]" Zool. Mus. Berlin: Kat. Nr. 337. Four males and a female.

"Lithobius calcaratus C.K." "Nürnberg" B.M.(N.H.) Reg. no. 13.6.18.18-33. Eight males and eleven females.

"Lithobius calcaratus C.K." "fränk. Jura" B.M.(N.H.) Reg. no. 13.6.18.34-44. Seven males and a female together with three females of *L. pelidnus* Haase.

"Lithobius calcaratus C.K." "München" B.M.(N.H.) Reg. no. 13.6.18.45. A female of *L. muticus* C. L. Koch.

"Lithobius calcaratus C.K." "Rom, [leg.] Seidlitz" B.M.(N.H.) Reg. no. 13.6.18.46-52. Three males and two females together with four females of *L. erythrocephalus* C. L. Koch.

"calcaratus? Nürnberg" B.M.(N.H.) Reg. no. 13.6.18.53-55 (part). A female each of *L. muticus*, *L. mutabilis* L. Koch and *L. pusillus pusillifrater* Verhoeff.

"Lithobius calcaratus C.K." "Nürnberg, missbildung der Analbeine" B.M.(N.H.) Reg. no. 13.6.18.53-55 (part). A male with the left 15th leg missing and the right 15th leg imperfectly regenerated without a femoral process.

TYPE SPECIMEN. A well-preserved male 10.5 mm long from Nuremberg answering to Latzel's (1880 : 105) description of *L. calcaratus* is here formally designated as the neotype (B.M.(N.H.) 13.6.18.18).

REMARKS. All the above males, which are either fully mature or 4th post-larval stadia with the femoral process on the 15th leg at least partly developed, are correctly labelled as we would expect, since they are easily identified from C. L. Koch's original description and illustration; but of the twenty-six females L. Koch labelled "*L. calcaratus*", no fewer than eleven were misdetermined. In fact, females of this species are quite easy to identify owing to the characteristic arrangement of the ocelli and the spinulation of the legs, and Koch may have been misled by colour, a rather variable feature to which he paid undue attention in his descriptions.

In one of the males from the Franconian Jura (B.M.(N.H.) 13.6.18.41) both 15th

legs are missing but a femoral process is present on the right 14th leg. This last character was used by Matic (1961) to define *Lithobius lanzae* Matic which therefore seems to be based on an aberrant specimen of *L. calcaratus*.

4. *Lithobius communis* C. L. Koch

Lithobius communis C. L. Koch, 1844 : 24, fig. 24. 1863, 2 : 47, fig. 169a & b. L. Koch, 1862 : 80, fig. 37.

TYPE LOCALITY. Germany.

MATERIAL EXAMINED. "Lithobius communis C. L. Koch, Nürnberg, leg. L. Koch [rewritten]" Zool. Mus. Berlin: Kat. Nr. 341. A male and a female, both mutilated 3rd post-larval stadia of *L. mutabilis* L. Koch.

"Lithobius communis C.K." "fränk. Jura" B.M.(N.H.) Reg. no. 13.6.18.64-86. Twelve immature males of *L. mutabilis*, four being 2nd post-larval stadia and eight being 3rd post-larval stadia. In addition there are four males and three females of *L. pusillus pusillifrater*, three immature males of *L. pelidnus* and two immature males of *L. muticus*.

"Lithobius communis C.K." "[hab.] Haspelmoos" B.M.(N.H.) Reg. no. 13.6.18.87. A mutilated female 3rd post-larval stadium of *L. mutabilis* and a female 4th post-larval stadium probably belonging to *L. lapidicola* Meinert (*sensu* Jeekel, 1964 *non* Latzel, 1880).

"Lithobius communis C.K." "Cusel [Rhineland Palatinate]" B.M.(N.H.) Reg. no. 13.6.18.88. A mutilated male 3rd post-larval stadium of *L. mutabilis*.

REMARKS. Of the above specimens, only the 3rd post-larval stadia of *L. mutabilis* agree exactly with L. Koch's description of *L. communis*. All that needs to be added to this description is that the ventral spine on the 15th tibia is VaT, an accessory apical claw is present on the 15th leg, and T.13 bears feeble posterior projections. Latzel (1880 : 102) suggested that L. Koch's description was based on immature specimens of *L. mutabilis* with the possible inclusion of males of *L. muticus* and *L. pelidnus*; he added that he had actually examined two of L. Koch's specimens of "*communis*" and found them to be immature males of *L. mutabilis* and *L. pelidnus*. However, neither the specimens of *muticus* nor those of *pelidnus* labelled "*communis*" by L. Koch have either the full complement of three ventral femoral spines or the single ventral tibial spine on the 15th leg as recorded by him for this form; nor are these spines present in *L. pusillus pusillifrater* in which the antennae are much shorter than in the example of *L. communis* illustrated by C. L. Koch (1863: fig. 169a). This last illustration does, in fact, resemble *L. mutabilis* more than any other species.

Latzel's tentative suggestion that *L. communis* C. L. Koch, 1844 is a synonym of *L. mutabilis* L. Koch, 1862 is therefore almost certainly justified and has been accepted by Haase (1880) and subsequent authors. But the name *L. communis* has not actually been used except as a junior synonym since Rosicky (1876) redescribed the species, and its revival would only cause confusion. It is intended therefore to ask the International Commission on Zoological Nomenclature to use its plenary powers

to suppress the name *communis* C. L. Koch 1844 as published in the binomen *Lithobius communis* C. L. Koch, and to suppress the name *minutus* C. L. Koch 1847 as published in the binomen *Lithobius minutus* C. L. Koch (see p. 118), as so to validate *Lithobius mutabilis* L. Koch.

5. *Lithobius grossipes* C. L. Koch

Lithobius grossipes C. L. Koch, 1847 : 146. 1863, 1 : 67, fig. 57a, b & c. L. Koch, 1862 : 32, fig. 4.

TYPE LOCALITY. Triest.

TYPE SPECIMEN. The holotype. B.M.(N.H.) Reg. no. 13.6.18.262.

REMARKS. All the specimens identified as *L. grossipes* by L. Koch are in the British Museum (Natural History) and were discussed in a previous publication (Eason, 1970a). Reasons for believing that a female from Idrija is the holotype were given and it was shown that *Eupolybothrus grossipes* (C. L. Koch) is a valid species and not a synonym of *E. fasciatus* (Newport) as was previously supposed.

6. *Lithobius punctulatus* C. L. Koch

Lithobius punctulatus C. L. Koch, 1847 : 147. 1863, 1 : 68, fig. 58a & b.? L. Koch, 1862 : 30, fig. 3.

TYPE LOCALITY. Triest.

MATERIAL EXAMINED. "L. punctulatus [rewritten]" "Dalmatien" B.M.(N.H.) Reg. no. 13.6.18.586. A mutilated female of *Eupolybothrus* sp. 25 mm long with no legs and broken antennae.

"L. punctulatus [rewritten]" "Griechenland" B.M.(N.H.) Reg. no. 13.6.18.587-588. Two cleared fragments of *Eupolybothrus* sp. with neither legs nor antennae, one from the head to T.9, the other from T.4 to the end of the body. Although obviously from different individuals, these fragments both seem to belong to the same species.

REMARKS. L. Koch's account of *L. punctulatus* was based on examples from Dalmatia and Greece with all their legs missing so there is little doubt that the above specimens are those in question. This account describes the tergal projections as short and broad which led Latzel (1880 : 56) to suspect that L. Koch was describing examples of *Eupolybothrus leptopus* (Latzel): but the shape of these projections in all three specimens is quite consistent with a diagnosis of one of the *fasciatus-grossipes* group of species. The Dalmatian specimen, however, has 11, 19, 21 and 21 coxal pores on the 12th to 15th legs respectively and this reduced number of pores, particularly those of the 12th, relative to those found in most examples of *E. grossipes* and related species of comparable size, is indeed rather suggestive of *E. leptopus*. On the other hand the fragment from Greece (with 24, 30, 32 and 27 coxal pores) is, in view of its locality, more likely to belong to *E. litoralis* (L. Koch), a species very close to *E. grossipes*.

C. L. Koch's descriptions and illustrations of *L. punctulatus* are difficult to interpret; there is no special reason to suppose that they apply either to *E. leptopus* or *E. litoralis*. Meinert (1872) used the name *L. punctulatus* C. L. Koch (probably correctly) to apply to *E. grossipes* but Latzel (1880 : 52) argued that C. L. Koch's original (1847) and subsequent (1863) descriptions of *punctulatus* do not apply to a species of *Eupolybothrus* at all but to *Lithobius validus* Meinert, 1872. Latzel's opinion has been accepted by some authors although Meinert's name for the latter species continues to be used by others. Owing to the uncertainty surrounding the identity of C. L. Koch's original specimen and of those L. Koch used for his re-description, *L. punctulatus* should be rejected as a *nomen dubium* and the species with which Latzel equated it should be known as *Lithobius validus* Meinert.

7. *Lithobius montanus* C. L. Koch

Lithobius montanus C. L. Koch, 1847 : 148. 1863, 2 : 8, fig. 132a & b. L. Koch, 1862 : 27, fig. 1.

TYPE LOCALITY. South Tyrol.

MATERIAL EXAMINED. "Lithobius grossipes C.K." "Seiseralpe [an alpine hut in Italy], [leg.] Gredler" B.M.(N.H.) Reg. no. 13.6.18.266. A male of *Eupolybothrus grossipes* 35 mm long, agreeing in detail with L. Koch's description of *L. montanus*.

REMARKS. L. Koch's redescription of this form was based on a single male sent him by Prof. P. Gredler from "Seiseralpe" in South Tyrol so the above specimen is undoubtedly the one in question. C. L. Koch in his original (1847) and subsequent (1863) accounts of *L. montanus* described the colour as uniform reddish-brown, and his coloured plate (1863: fig. 132a) is of a pale brown specimen without the dark dorsal pattern he illustrated in a comparable coloured plate of *L. grossipes* (1863: fig. 57a). L. Koch described the colour of *L. montanus* as paler anteriorly than posteriorly, making no mention of a dark pattern, and it seems that this relatively pale colour together with a trivial structural aberration in the holotype of *L. grossipes* mentioned in his key led him to copy his father in supposing that *montanus* and *grossipes* were distinct species. Sometime between finishing his book and completing his collection he must have decided to discard these two characters as a means of differentiating species, changing the name of his specimen from *montanus* to *grossipes*. Latzel (1880 : 48), while recognizing *L. montanus* as a synonym of *L. grossipes*, pointed out that it differs in colour from his own specimens, and Dalla Torre (1882) and Attems (1929) both retained the name *montanus* for a pale variety of *L. grossipes*. Although the holotype of *L. grossipes* has been dried and the original colour pattern had probably been lost before it was examined by L. Koch, many preserved specimens of *L. grossipes* show more evidence of a dark pattern than does L. Koch's specimen of *montanus*. However, colour is a poor taxonomic character in the Lithobiidae and there is no justification for regarding *L. montanus* as other than a synonym of *L. grossipes*.

8. *Lithobius glabratus* C. L. Koch

Lithobius glabratus C. L. Koch, 1847 : 149. 1863, 1 : 131, fig. 121a & b.

TYPE LOCALITY. Bavaria.

REMARKS. L. Koch (1862) was not familiar with this species and there is no material referable to *L. glabratus* in the Koch Collection. Latzel, however, was satisfied as to its identity and gave a full description (Latzel, 1880 : 74). Pocock (1890), after examining the type specimen of *L. melanops* Newport, 1845, proposed *L. glabratus* as a synonym and this species is now universally known as *L. melanops* Newport (see also Eason, 1971).

9. *Lithobius agilis* C. L. Koch

(Fig. 1)

Lithobius agilis C. L. Koch, 1847 : 149. 1863, 1 : 132, fig. 122a & b. L. Koch, 1862 : 52, fig. 17.

TYPE LOCALITY. Bavaria.

MATERIAL EXAMINED. "Lithobius agilis C. L. Koch, Nürnberg, leg. L. Koch [rewritten]" Zool. Mus. Berlin: Kat. Nr. 334. A male and a female, both mutilated.

"Lithobius agilis C. Koch" "Mögeldorf, [hab.] Erlenwälddren" B.M.(N.H.) Reg. no. 13.6.18.4-8. Three males and two females in fair condition.

TYPE SPECIMEN. A fairly well-preserved female 9.5 mm long from Mögeldorf near Nuremburg answering to Latzel's (1880 : 78) description of *L. agilis* is here formally designated as the neotype (B.M.(N.H.) 13.6.18.4).

REMARKS. The spurs on the gonopods of the neotype (Fig. 1) and the only other female in the Collection with intact gonopods (Kat. Nr. 334) are just as slender as those figured by Loksa (1948: fig. 3) as characteristic of *L. agilis pannonicus* Loksa from Hungary, although they are rather less expanded in the distal one third with the extremity less obviously serrate. Neither L. Koch nor Latzel figured these spurs but they both described them as long and slender. Loska may have been misled into assuming that the typical form of the species bears relatively short, stout spurs by Brolemann's (1930: fig. 429) figure of a specimen of *L. agilis* from the Pyrenees in which the external spur is barely three times longer than broad. The spurs of specimens of this species from Austria (Eason, 1964: fig. 414) are intermediate in shape between those figured by Brolemann and those of the neotype, so there is little justification for naming a subspecies on the basis of this character.

10. *Lithobius curtipes* C. L. Koch

Lithobius curtipes C. L. Koch, 1847 : 150. 1863, 2 : 7, fig. 131a & b. L. Koch, 1862 : 68, fig. 29.

TYPE LOCALITY. Bavaria.

MATERIAL EXAMINED. "Lithobius curtipes C. L. Koch, Nürnberg, leg. L. Koch

[rewritten]" Zool. Mus. Berlin: Kat. Nr. 339. Four males and two females together with a male of *L. aeruginosus* L. Koch.

"*Lithobius curtipes* C. Koch" "Nürnberg, [hab.] Haspelmoos" B.M.(N.H.) Reg. no. 13.6.18.111-121. Four males and four females together with a male and a female of *L. aeruginosus* and an immature male of *L. crassipes* L. Koch.

"*curtipes*, Franzensbad [Frantiskovy Lazne, Czechoslovakia]" B.M.(N.H.) Reg. no. 13.6.18.122. A single female.

"*Lithobius curtipes* C. Koch" "Lithauen [Lithuania]" B.M.(N.H.) Reg. no. 13.6.18.123-126. Three males and a female.

"*curtipes?*, Nürnberg" B.M.(N.H.) Reg. no. 13.6.18.127-128. Two immature males.

"*L. curtipes?*, Böhmen [Bohemia] [rewritten]" B.M.(N.H.) Reg. no. 13.6.18.633-636. Two males and two females.

TYPE SPECIMEN. A well-preserved male 9 mm long from Nuremberg answering to Latzel's (1880 : 130) description of *L. curtipes* is here formally designated as the neotype (B.M.(N.H.) 13.6.18.111).

REMARKS. There is no doubt at all that the above specimens, other than the three examples of *L. aeruginosus* and the single one of *L. crassipes*, belong to the species known to western European authors as *L. curtipes*: the 15th tibial projection in the neotype and the other adult males is the same as that found in British specimens (Eason, 1951: fig. 1). The inclusion by L. Koch of examples of *L. aeruginosus* among those of *L. curtipes* may be accounted for by the fact that he based his original description of *L. aeruginosus* on immature males (one of them actually belonging to *L. curtipes*) and was unaware of the true nature of this species.

In order to understand the controversy surrounding the identity of *L. curtipes* it is necessary to consider the different interpretations placed by various authors on L. Koch's description. Since C. L. Koch only examined females he did not mention the 15th tibial projection, which is only found in males, in either of his descriptions, but L. Koch described it as "*einen kurzen kegelförmigen Forsatz.*" This is both imprecise and misleading, since the projection barely assumes a conical shape even when fully developed; but L. Koch also described and figured the arrangement of the ocelli (L. Koch, 1862: fig. 29) which is fairly characteristic. Stuxberg (1871:501) described the tibial projection rather more accurately as "*en tydligt utskjutande rundad process*" (a distinct projecting rounded process) as well as describing the arrangement of the ocelli.

Confusion began when Meinert, after examining the specimens on which Porat (1869) quite correctly based his records of *L. curtipes*, noted that the ocelli were not arranged exactly as figured by L. Koch and that the projection was borne on the 5th article of the 15th leg and not on the 4th as L. Koch stated, and assumed that these specimens did not belong to *L. curtipes* but represented a form of *L. crassipes* (Meinert, 1872: 341). Meinert also assumed that the projection he found on Porat's specimens was of a different shape from the conical projection described by L. Koch which he understood to refer to a more clearly differentiated process such as that found on the 15th femur of males of *L. calcaratus*: but his description of

this projection — “*dannedes kun af et fremspringende Hjørne af Leddets Bagrand — en Rende forstattes ind paa Fremragningen*” (formed only by a projecting corner of the posterior edge of the article, with a groove running onto the projection) — is the earliest really accurate account in the literature and there is no doubt that Porat’s specimens did belong to *L. curtipes*. The arrangement of the ocelli in this species can be misleading as they may occur in irregular rows rather than in a rosette (Eason, 1964: 238) and the confusion over numbering the articles of the 15th legs must have been due either to an error on the part of Koch or to a misprint. Stuxberg (1876 : 25) perpetuated Meinert’s mistake and attributed his own earlier (1871) description of *L. curtipes* to *L. crassipes*.

Both Latzel (1880 : 131) and Haase (1880 : 39) rectified Meinert’s mistake and gave adequate accounts of *L. curtipes* under its correct name, but they both repeated Koch’s rather misleading expression, “*kurzen kegelförmigen Forsatz*”, in describing the tibial projection, although Latzel supplemented this by mentioning the groove on the dorsal surface. Porat (1889) described the species correctly but gave no details of the shape of the tibial projection. It was, no doubt, the failure of most of these early western European authors to give really full and accurate accounts of the projection, and the fact that the best description, Meinert’s, was attributed to *L. crassipes*, that led Muralewitsch (1926) and Loksa (1947) to apply the name *L. curtipes* C. L. Koch to an eastern European species which does not occur in Bavaria and which was originally described by Sseliwanoff (1880) from the Crimea. This species, *L. pusillus* Sseliwanoff, is very similar to *L. curtipes* but the rounded tibial projection is replaced by a small cylindrical spur very much the same in structure as the femoral process found in *L. calcaratus*, a structure wrongly envisaged by Meinert as occurring in *L. curtipes*.

Sseliwanoff (1880), who wrote in Russian, as well as describing *L. pusillus*, gave a clearly recognizable account of *L. curtipes* which he named as a new species, *L. vicinus* Sseliwanoff. Loksa (1947), who cannot have been familiar with Sseliwanoff’s work, gave another very adequate account of *L. curtipes* which he named as another new species, *L. baloghi* Loksa. Some modern eastern European authors have followed Loksa’s nomenclature, naming *L. curtipes*, which occurs at least as far east as the Caucasus, as *L. baloghi*, and *L. pusillus* Sseliwanoff as *L. curtipes*.

Although Sseliwanoff’s paper describing *L. pusillus* appeared in volume 11 of *Trudy Russkago Entomologicheskago Obshchestva*, the volume for 1878, it was not actually published until 1880 and Garbowski (1897), assuming the name to be pre-occupied by *L. pusillus* Latzel, 1880, proposed the new name *sseliwanoffi* for Sseliwanoff’s species; but this proposal has never been followed. *L. pusillus* Sseliwanoff seems to have been described repeatedly by various authors either as a new species or as a subspecies of *L. curtipes*. *L. ferganensis* Trotzina may prove to be its valid name (Lignau, 1914) but Trotzina’s (1893) description is not altogether clear. *L. curtipes turkestanicus* Attems, the original description of which is accompanied by an illustration of the tibial projection (Attems, 1904: fig. 2), is undoubtedly identical with *L. pusillus* Sseliwanoff and the species has recently become known as *L. turkestanicus* Attems, while the true *L. curtipes* continues to be known as *L. baloghi* in eastern Europe.

A final point of nomenclatural interest is that *L. curtipes* C. L. Koch was designated by Verhoeff (1905) as the type species of the subgenus *Monotarsobius* to which *L. turkestanicus* also belongs.

11. *Lithobius erythrocephalus* C. L. Koch

Fig. 2

Lithobius erythrocephalus C. L. Koch, 1847 : 150. 1863, 2 : 22, fig. 145a, b & c. L. Koch, 1862 : 68, fig. 39.

TYPE LOCALITY. Bavaria.

MATERIAL EXAMINED. "Lithobius erythrocephalus C. K." "Happurg" B.M.(N.H.) Reg. no. 13.6.18.139-141. Two males and a female.

"Lithobius erythrocephalus C.K." "[hab.] Glaishammer Wäldren" B.M.(N.H.) Reg. no. 13.6.18.142-151. Nine females together with a female of *L. mutabilis*.

"Lithobius erythrocephalus C.K." "Bozen [Bolzano, Italy]" B.M.(N.H.) Reg. no. 13.6.18.152. A single female.

TYPE SPECIMEN. A well-preserved female 13 mm long from Happurg in the Franconian Jura answering to Latzel's (1880 : 110) description of *L. erythrocephalus* is here formally designated as the neotype (B.M.(N.H.) 13.6.18.139).

REMARKS. A number of subspecies of *L. erythrocephalus* have been described depending for their definition on the shape of the spurs on the female gonopods, the sculpturing of the male 15th tibiae, the shape of the short tergites, and the number of antennal articles. The genital spurs of the neotype are figured (Fig. 2) and those of the other females recorded above are of much the same shape. The 15th tibiae of the males from Happurg are oval in cross-section, without secondary sexual characters. All specimens of both sexes have feeble posterior projections on T.13 and their antennal articles vary from 29 to 31.

The neotype and other females all agree with the modern conception of the nominate subspecies, but Dobroruka (1962) stated that the males of this subspecies have flattened 15th tibiae. This feature is not shown by the males from Happurg (the designate type locality) although other males of *L. erythrocephalus* in the Collection from the Franconian Jura labelled "*mutabilis*" by L. Koch (B.M.(N.H.) Reg. no. 13.6.18.459-460) do have markedly flattened 15th tibiae: it thus seems that this is an unstable character, not associated with any particular subspecies (see also Eason, 1970b).

12. *Lithobius muticus* C. L. Koch

Lithobius muticus C. L. Koch, 1847 : 151. 1863, 1 : 118, fig. 107a & b. L. Koch, 1862 : 79, fig. 36.

TYPE LOCALITY. Bavaria.

MATERIAL EXAMINED. "muticus, Nürnberg" B.M.(N.H.) Reg. no. 13.6.18.532-533. Two females of *L. calcaratus*.

"L. muticus [rewritten]" "Eichstaedt, Happurg" B.M.(N.H.) Reg. no. 13.6.18.

534-550. Six males of *L. muticus*, six females of *L. pelidnus*, and four females and one male of *L. mutabilis*,

"*L. muticus* [rewritten]" "[hab.] Valzner Weiher" B.M.(N.H.) Reg. no. 13.6.1855-562. Four males of *L. muticus* and eight females of *L. pelidnus*.

"*L. muticus* [rewritten]" "München" B.M.(N.H.) Reg. no. 13.6.18.536-566. Two males and a female of *L. muticus* and a female of *L. mutabilis*.

TYPE SPECIMEN. A male 13 mm long from Eichstätt or Happurg, both in the Franconian Jura, is here formally designated as the neotype (B.M.(N.H.) 13.6.18.534). This is the largest and best preserved available specimen of *L. muticus*, showing the characteristic broad head and the small setose swelling on the 14th tibia, and agreeing in all respects with Latzel's (1880 : 116) description of males of this species.

REMARKS. The characteristic swelling on the 14th tibia of the male was not mentioned either by C. L. Koch or L. Koch in their published descriptions of *L. muticus*, but L. Koch did mention it in private correspondence with Latzel (Latzel, 1880 : 119) so there is no doubt about the identity of the males on which he based his description. The same cannot, however, be said of the females.

In his key L. Koch contrasted the incurved internal pair of spurs on the gonopods of *L. mutabilis* with the straight spurs of those of *L. muticus* in order to differentiate between females of these two species; he also described the claw of the gonopod of *L. muticus* as tripartite. In fact, incurving of these spurs, although not invariable, is usually more marked in *muticus* than in *mutabilis* and the claw of *muticus* has the external denticle so reduced as to appear bipartite. It seems, therefore, that L. Koch did not have females of *L. muticus* before him when he described this species but those of *L. pelidnus* and *L. mutabilis* in which the internal spurs, particularly in *pelidnus*, are often straight and the claw always tripartite. Most of the females of *L. muticus* in the Collection were identified by L. Koch as *L. mutabilis*.

C. L. Koch's original description of this species is unsatisfactory but his illustrations of a female (C. L. Koch, 1863 : fig. 107) resemble the species regarded as *L. muticus* more than any other and there is no reason to dispute its identity.

13. *Lithobius varius* C. L. Koch

Lithobius varius C. L. Koch, 1847 : 151. 1863, 1 : 128, fig. 118a & b.

TYPE LOCALITY. Bavaria.

REMARKS. L. Koch (1862) was not familiar with this species and there is no material referable to *L. varius* in the Koch Collection. C. L. Koch's illustrations of a female (C. L. Koch, 1863 : fig. 118) are quite consistent with Latzel's (1880 : 126) suggestion that this species may be identical with *L. aeruginosus* L. Koch, but there is no certainty of this and *L. varius* should be rejected as a *nomen dubium*.

14. *Lithobius minutus* C. L. Koch

Lithobius minutus C. L. Koch, 1847 : 152. 1863, 1 : 129, fig. 119a & b. L. Koch, 1862 : 84, fig. 40.

TYPE LOCALITY. Bavaria.

MATERIAL EXAMINED. "Lithobius minutus C. L. Koch, Nürnberg, leg. L. Koch [rewritten]" Zool. Mus. Berlin: Kat. Nr. 342. Twelve badly mutilated immature specimens of *Lithobius* sp. with neither legs nor antennae, probably 1st and 2nd post-larval stadia of *L. mutabilis*.

"L. minutus [rewritten]" "fränk. Jura" B.M.(N.H.) Reg. no. 13.6.18. 387-400. Fourteen 1st post-larval stadia of *L. mutabilis* together with a 2nd post-larval stadium of another species, probably *L. pusillus pusillifrater*.

"L. minutus [rewritten]" "[hab.] Haspelmooz" B.M.(N.H.) Reg. no. 13.6.18.401. A 4th larval stadium and three badly mutilated 1st post-larval stadia, all probably belonging to *L. pusillus pusillifrater*.

"L. minutus [rewritten]" "Nürnberg" B.M.(N.H.) Reg. no. 13.6.18.402-433. Thirty-two immature specimens of *L. mutabilis* ranging from a 4th larval stadium to 2nd post-larval stadia.

REMARKS. Of the above specimens, only the 1st post-larval stadia of *L. mutabilis* agree exactly with L. Koch's description of *L. minutus*. Latzel (1880 : 228) gave *L. minutus* as a synonym of *L. mutabilis* and Haase (1880 : 32) redescribed the form in some detail, coming to the same conclusion. Although it is undoubtedly a senior synonym of *L. mutabilis* (and a junior synonym of *L. communis*), the name has not been used by subsequent authors, and, in order to validate *L. mutabilis*, it is intended to ask the International Commission on Zoological Nomenclature to use its plenary powers to suppress the name *minutus* C. L. Koch 1847 as published in the binomen *Lithobius minutus* C. L. Koch, and to suppress the name *communis* C. L. Koch 1844 as published in the binomen *Lithobius communis* C. L. Koch (see also p. 111).

15. *Lithobius inermis* L. Koch

Lithobius inermis L. Koch in Rosenhauer, 1856 : 415. L. Koch, 1862 : 65, fig. 26.

TYPE LOCALITY. Malaga, Spain.

REMARKS. *L. inermis* was originally described from a specimen borrowed from the Rosenhauer Collection. Dr. Egon Popp, curator of the Zoologische Staatssammlung, Munich, informs me that many of Rosenhauer's specimens were sold to the Alte Akademie, Munich, the precursor of the Staatssammlung, but that most of them were destroyed during the Second World War. Whether the type specimen of *L. inermis* was among this material is not known, but it has not been found in Munich and there is no record of Rosenhauer having deposited any of her specimens elsewhere. Koch's earlier (1856) description of this species is very scanty but his subsequent (1862) one is recognizable and Brolemann (1926 : 264) described it very fully.

16. *Lithobius festivus* L. Koch

Lithobius festivus L. Koch 1862 : 29, fig. 2.

TYPE LOCALITY. Garmisch, Bavaria.

MATERIAL EXAMINED. Among the specimens Koch correctly identified as *L. grossipes* the holotype and most of the specimens from South Tyrol bear an additional name, "*festivus*", in Koch's hand. But the only specimen of this species in the Collection from Garmisch is merely labelled "*Lithobius grossipes*" "Garmisch" (see also Eason, 1970a).

TYPE SPECIMEN. *L. festivus* was originally described from a male and a female from Garmisch borrowed from the Keyserling Collection. The specimen referred to above, a male pseudomaturus 24 mm long, in spite of being labelled "*L. grossipes*" and having 49 antennal articles (Koch gave 46-47), is in agreement with Koch's description in other respects and is undoubtedly the male in question, the sole surviving syntype (B.M.(N.H.) 13.6.18.293). The female syntype must have been returned to the Keyserling Collection and has not been found.

REMARKS. C. L. Koch based *Lithobius grossipes* on an aberrant specimen and *L. montanus* (= *grossipes*) on a specimen without the dark dorsal pattern on the tergites frequently found in *grossipes* (see p. 112). *L. festivus* was based on smaller specimens with the dorsal pattern distinct but with the ocelli of the superior row round, and not oval as in large adults. It is not surprising, therefore, that L. Koch at first thought that he was dealing with three distinct species. But it is clear from his labelling of his specimens that he later realised their true identity although he may, at one stage, have regarded *festivus* as a variety of *grossipes* and only finally as a true synonym.

17. *Lithobius transmarinus* L. Koch

Lithobius transmarinus L. Koch, 1862 : 33, fig. 5.

TYPE LOCALITY. New Orleans, U.S.A.

REMARKS. The identity of *L. transmarinus* is discussed along with that of the next species.

18. *Lithobius mordax* L. Koch

Lithobius mordax L. Koch, 1862 : 34, fig. 6.

TYPE LOCALITY. New Orleans, U.S.A.

REMARKS. *L. transmarinus* and *L. mordax* seem each originally to have been described from a single specimen, a female and a male respectively, borrowed from the Keyserling Collection: neither of these has been found. There is little in the original descriptions of these two species to suggest that they are distinct from one another and some authors have regarded them as identical. Bollman (1893) believed them both to be synonyms of *L. spinipes* Say, 1821, but Brolemann (1896) disputed this synonymy and regarded them both as distinct species. Chamberlin

(1911) at one time believed *transmarinus* to be the female of *mordax* but in a later publication (Chamberlin, 1925b) he described them as separate species of *Ncolithobius* Stuxberg. These descriptions of Chamberlin's seem to apply to two distinct species and their validity has not recently been disputed.

19. *Lithobius trilineatus* L. Koch

Lithobius trilineatus L. Koch, 1862 : 37, fig. 8.

TYPE LOCALITY. Bahia, Brazil.

MATERIAL EXAMINED. "L. trilineatus, Bahia [rewritten]" B.M.(N.H.) Reg. no. 13.6.18.651. A female of *L. forficatus* 20 mm long with the 14th and 15th legs missing.

TYPE SPECIMEN. *L. trilineatus* was originally described from a male and a female from Bahia borrowed from the Keyserling Collection. The above specimen of *L. forficatus* agrees with this description and is undoubtedly the female in question, the sole surviving syntype. The male syntype must have been returned to the Keyserling Collection and has not been found.

REMARKS. Koch distinguished this form from *L. forficatus* by means of a number of sulci he observed on the 15th legs, but these are not reliable characters in *L. forficatus*. Synonymy of *L. trilineatus* with *L. forficatus* was first proposed by Fedrizzi (1877) and has never been disputed. As Brolemann (1909) pointed out, the species must have been introduced to Brazil.

20. *Lithobius forficatus* var. *villosus* L. Koch

Lithobius forficatus var. *villosus* L. Koch, 1862 : 41.

TYPE LOCALITY. Bavarian Alps.

MATERIAL EXAMINED. "Lithobius forficatus L." "var. villosus, Bayer. Alpen" B.M.(N.H.) Reg. No. 13.6.18.242. A male of *L. forficatus* 22 mm long with the 15th legs missing.

"forficatus var. villosus, Alpen" B.M.(N.H.) Reg. no. 13.6.18.245-246. A male and a female of *L. forficatus*.

TYPE SPECIMEN. *L. forficatus* var. *villosus* was originally described from a single male and although the male labelled "Bayer. Alpen" has 10, 9, 9 and 7 coxal pores on the 12th and 15th legs respectively (Koch gave 9, 9, 9, 6) it agrees with this description in other respects and is undoubtedly the holotype.

REMARKS. Koch distinguished var. *villosus* from the typical form of the species by the larger number of ocelli and coxal pores, the longer 15th legs, and a number of other quite trivial characters. Although the 15th legs of the holotype are missing, those of the other two specimens of *villosus* in the Collection are barely longer than is usual in *L. forficatus*. The other characters of the holotype also fall well within normal limits for the species and *villosus* has never been regarded as a valid variety or subspecies.

21. *Lithobius parisiensis* L. Koch

Lithobius parisiensis L. Koch, 1862 : 42, fig. 10.

TYPE LOCALITY. Paris.

REMARKS. The original description of *L. parisiensis* was based on a single specimen borrowed from the Keyserling Collection which has not been found. It was described, like *L. trilineatus*, as having sulci on the 15th legs, but as differing from both *L. trilineatus* and *L. forficatus* in having more ocelli (39), prosternal teeth (8 + 8) and coxal pores (9, 10, 9, 7). Stuxberg (1871) suggested *L. parisiensis* as a possible synonym of *L. forficatus* but Haase (1880), who had examined Keyserling's specimen, believed it to be a distinct species. However, all the distinctive features of this form are sometimes found in large specimens of *L. forficatus* and, although there is every possibility of an introduced centipede being found in Paris, there is no known species of *Lithobius* to which the description of *parisiensis* might apply other than *forficatus* and there is little doubt that Stuxberg was correct.

22. *Lithobius muscorum* L. Koch

Lithobius muscorum L. Koch, 1862 : 43, fig. 11.

TYPE LOCALITY. Germany.

MATERIAL EXAMINED. "L. muscorum [rewritten]" "[hab.] Valzner Weiher" B.M.(N.H.) Reg. no. 13.6.18.434. A female pseudomaturus of *L. forficatus* 14 mm long.

TYPE SPECIMEN. The original description of *L. muscorum* was based on a single female and agrees well with the above specimen of *L. forficatus* which is undoubtedly the holotype. No locality was given in the original description, nor is there a locality label accompanying the holotype, so the presumption is that the specimen was found somewhere in Germany.

REMARKS. Of the features Koch regarded as characteristic of this form, the circular coxal pores are commonly found in immature stadia of *L. forficatus*, the rather short antennae with only 33 articles are just within normal limits for the pseudomaturus of this species and the shape of the tergal projections which Koch mentions in his key is quite unremarkable in the holotype. Synonymy of *L. muscorum* with *L. forficatus* was first proposed by Stuxberg (1871) and has never been disputed.

23. *Lithobius hortensis* L. Koch

Lithobius hortensis L. Koch, 1862 : 45, fig. 12.

TYPE LOCALITIES. Nuremberg; Landstuhl, Rhineland Palatinate.

MATERIAL EXAMINED. "Lithobius hortensis L. Koch, Syntypen, Nürnberg, leg. L. Koch [rewritten]" Zool. Mus. Berlin: Kat. Nr. 335. Two male pseudomaturus and a small adult female of *L. forficatus*.

"*L. hortensis* [rewritten]" "Nürnberg, [hab.] in Gärten" B.M.(N.H.) Reg. no. 13.6.18.303-318 (part). Five males and eleven females of *L. forcifatus*, all either praematurus, pseudomaturus or small adults.

"*L. hortensis* [rewritten]" "Nürnberg" B.M.(N.H.) Reg. no. 13.6.18.303-318 (part). Four exuviae of *L. forcifatus*. Two appear to be from adult males, one from a male pseudomaturus and the other from a female pseudomaturus.

"*L. hortensis* [rewritten]" "Landstuhl" B.M. (N.H.) Reg. no. 13.6.18.319-321. Two male pseudomaturus and a small adult female of *L. forcifatus*.

TYPE SPECIMENS. The original description of *L. hortensis* was based on a number of specimens of both sexes and all the above examples of *L. forcifatus*, except the exuviae, seem to belong to the syntypical series.

REMARKS. Koch distinguished this form from *L. muscorum*, with which it agrees in having circular coxal pores, by the longer antennae and the shape of the tergal projections neither of which have any taxonomic significance. In fact, the coxal pores in some of the larger and more mature syntypes are oval but in no case are they oblong or split-shaped as in most large adults of *L. forcifatus*.

Synonymy of *L. hortensis* with *L. forcifatus* was first proposed by Meinert (1868) and has been accepted by most authors. Latzel (1880 : 61), however, suggested that adults of *L. forcifatus* with circular coxal pores might be regarded as a variety (subspecies) and Verhoeff (1937) considered this form, which he called *L. forcifatus* var. *hortensis*, to be predominant in the Mediterranean region. But there is no justification for retaining *hortensis* as the name of a subspecies or even a variety since the shape of the coxal pores in adults of *L. forcifatus* varies continuously, showing every gradation in shape from circular, oval, oblong to slit-shaped even in specimens from the same locality.

24. *Lithobius sordidus* L. Koch

Lithobius sordidus L. Koch, 1862 : 47, fig. 13.

TYPE LOCALITY. Munich district.

REMARKS. The original description of *L. sordidus* was based on a single female borrowed from the Keyserling Collection which has not been found. It seems to apply to a pseudomaturus of *L. piceus* L. Koch with only 43 antennal articles, no ventral spines on the 15th tibia and only 2 + 2 spurs on the gonopods. Latzel's (1880 : 64) proposal of *L. sordidus* as a synonym of *L. piceus* is probably justified.

25. *Lithobius fossor* L. Koch

Lithobius fossor L. Koch, 1862 : 48, fig. 14.

TYPE LOCALITY. Grütz, near Nuremberg; Ehrenbürg, Franconian Jura.

MATERIAL EXAMINED. "Lithobius fossor L.K." "Grütz [Grütz]" B.M. (N.H.) Reg. no. 13.6.18.248. A male pseudomaturus of *L. piceus* 11.5 mm long.

"Lithobius fossor L. Koch" "Ehrenbürg" B.M.(N.H.) Reg. no. 13.6.18.249. A male pseudomaturus of *L. piceus* 12.5 mm long.

TYPE SPECIMENS. Although neither of the above specimens of *L. piceus* agrees with the original description of *L. fossor* in every detail, there is little doubt that they are the two males on which this description was based and are therefore the syntypes.

REMARKS. Koch distinguished this form from *L. sordidus* by the more numerous antennal articles and the presence of two ventral spines on the 15th tibia. The syntypes have 52 and 47 antennal articles respectively (Koch gave 49) and VaT is the only ventral spine on the 15th tibia of either specimen. A second ventral spine on this article (VmT) is most unusual in *L. piceus* and it is unlikely that Koch had any specimens before him other than these two syntypes when he wrote his rather inaccurate description. Synonymy of *L. fossor* with *L. piceus* was first proposed by Latzel (1880 : 64) and has never been disputed.

26. *Lithobius piceus* L. Koch

Fig. 7

Lithobius piceus L. Koch, 1862 : 49, fig. 15.

TYPE LOCALITY. Garmisch, Bavaria.

MATERIAL EXAMINED. "piceus, fränk. Jura" B.M.(N.H.) Reg. no. 13.6.18.577. A female pseudomaturus.

"piceus?, Nürnberg" B.M.(N.H.) Reg. no. 13.6.18.578-579. Two female pseudomaturus.

REMARKS. *L. piceus* was originally described from a mature female borrowed from the Keyserling Collection which has not been found. None of the above specimens belong to the original material and must have been named by Koch after he had finished writing his book. Garmisch, the type locality of *L. piceus*, is only some 200 Km. from Nuremberg and the Franconian Jura and there is no reason to doubt that the specimens from these localities are identical with the form originally described, but owing to their immaturity none of them is suitable for selection as a neotype.

Koch distinguished *L. piceus* from *L. sordidus* and *L. fossor* by the more numerous antennal articles, ocelli and coxal pores, all features of maturity. Like *fossor*, *piceus* was described as having two ventral spines on the 15th tibia, presumably VmT in addition to the usual VaT: although Haase (1880) mentioned an occasional second ventral spine on this article, it was not mentioned either by Latzel (1880) or Brolemann (1930) in their descriptions of *L. piceus*. Tobias (1969) examined 80 examples of this species from the Pyrenees and found 15VmT on one side of one individual only, so that either the type specimen was unusual or, as in the case of *L. fossor*, Koch was mistaken.

Another character Koch used to distinguish between *piceus* and *sordidus* was the number of spurs on the female gonopods, 3 + 3 in the former and 2 + 2 in the latter. The female pseudomaturus of *piceus* frequently has the full complement of 3 + 3 spurs but the internal pair are very small or may be absent. The female in the

Collection from the Franconian Jura has 3 + 3 spurs but those from Nuremberg have 3 + 2 and 2 + 2, and it was probably this that led Koch to be uncertain of their identity.

Perhaps the most significant feature shown by the above examples of *L. piceus*, as well as by both of those of *L. fossor*, is the relative slenderness of the tarsi and metatarsi of the 15th legs, the distal extremity of the tibia being broader than the base of the tarsus in the ratio 3 : 2 (Fig. 7). Brolemann's figure of *L. piceus gracilitarsis* Brolemann (Brolemann, 1930 : fig. 400) shows about the same relative change in breadth between these two adjacent articles and it seems that he (Brolemann, 1898) described this subspecies from the Pyrenees on the assumption that it differed from the typical form in this respect. However, in addition to Koch's specimens, English examples and those from Italy (Eason, 1964: figs 342 & 343), the latter answering to the description of *L. piceus verhoeffi* Demange, 1958, show that same abrupt transition in the breadth of the leg at the 15th tibiotarsal articulation so it seems that this character is widespread throughout the species. Moreover, *L. piceus gracilitarsis* was recorded by Negrea (1965) from Transylvania and by Folkmanova (1951, 1954) and Folkmanova and Lang (1955, 1960) from a number of localities in Czechoslovakia and southern Poland, and although Matic and Darabantu (1968) suggested that the slender tarsi of the specimens on which some of these records were based may be features of immaturity, this is not the case in English specimens. On the other hand Brolemann (1930 : 262) described the Alpine form of *L. piceus* (which he regarded as the nominate subspecies) as having no abrupt transition in breadth between the 15th tibia and tarsus. It we assume that most records of *L. piceus* refer to this latter form, the comparative distribution of *L. piceus* and *L. p. gracilitarsis* does not suggest that we are dealing with two subspecies but that the shape of the 15th legs in *L. piceus* is variable and that subsp. *gracilitarsis* has no real status. There is also the possibility that some records of *L. piceus piceus* in the literature may refer to a closely related species, *L. peregrinus* Latzel, 1880, in which the 15th tarsi and metatarsi are relatively stout.

27. *Lithobius coriaceus* L. Koch

Lithobius coriaceus L. Koch, 1862 : 51, fig. 16.

TYPE LOCALITY. Germany.

MATERIAL EXAMINED. "Lithobius coriaceus L.K." "fränk. Jura" B.M.(N.H.) Reg. no. 13.6.18.88-91. Two agenitalis II and a male immaturus of *L. forficatus*.

"Lithobius coriaceus L.K." "Gritz [Grütz, near Nuremberg], [hab.] Garten" B.M.(N.H.) 13.6.18.92-96. Two agenitalis I, an agenitalis II and two male immaturus of *L. forficatus*.

"Lithobius coriaceus L.K." "Dietenhofen [Franconian Jura]" B.M.(N.H.) Reg. no. 13.6.18.97. An agenitalis II of *L. forficatus*.

TYPE SPECIMENS. The original description of *L. coriaceus* was based on a number of specimens and all the above examples of *L. forficatus* seem to belong to the syntypical series.

REMARKS. Koch had both sexes of the stadium immaturus as well as agenitalis (which he took to be males) before him when he described this form, so the above series which does not include females is incomplete. Of the key characters given by Koch, 4 + 4 prosternal teeth is exceeded in one immaturus (4 + 5) while two ventral spines are never found on the 15th tibia of the agenitalis of *L. forficatus*, so his description is not altogether accurate. Synonymy of *L. coriaceus* with *L. forficatus* was first proposed by Stuxberg (1871) and has never been disputed.

28. *Lithobius velox* L. Koch

Lithobius velox L. Koch, 1862 : 56, fig. 19.

TYPE LOCALITIES. Landstuhl, Rhineland Palatinate; Franconia; Vienna district.

MATERIAL EXAMINED. "L. velox [rewritten]" "Landstuhl" B.M.(N.H.) Reg. no. 13.6.18.616-617. A male and a female of *L. melanops* Newport.

"L. velox [rewritten]" "Dietenhofen [Franconian Jura]" B.M.(N.H.) Reg. no. 13.6.18.618. A male 4th post-larval stadium of *L. melanops*.

"L. velox [rewritten]" "Wien" B.M.(N.H.) Reg. no. 13.6.18.619. A mutilated female of *L. melanops*.

TYPE SPECIMENS. The original description of *L. velox* was based on a number of specimens of both sexes and all the above examples of *L. melanops* certainly belong to the syntypical series.

REMARKS. The size, the number of ocelli, and the number of coxal pores both in Koch's description and in the syntypes are all close to the lower normal range for adults and the upper range for 4th post-larval stadia of *L. melanops*. Meinert (1868) suggested *L. velox* as a possible synonym of *L. bucculentus* L. Koch, under which he was probably describing examples of *L. melanops*. Synonymy of *L. velox* with *L. glabratus* (= *melanops*) was first proposed by Latzel (1880 : 74) and has never been disputed.

29. *Lithobius bucculentus* L. Koch

Lithobius bucculentus L. Koch, 1826 : 57, fig. 20.

TYPE LOCALITY. Munich district.

MATERIAL EXAMINED. "bucculentus Mein.(?), Ratzes [Rasa, Italy] leg. Milde" B.M.(N.H.) Reg. no. 13.6.18.17. A single male of *L. tricuspis* Meinert.

REMARKS. Koch's original description of *L. bucculentus* as having sharp posterior projections on T.9, 11 and 13, and the antennae and 15th legs both over half the body-length is much more suggestive of *L. tricuspis* than of *L. melanops* (of which it has hitherto been regarded as a synonym), but this description was based on a male from Munich borrowed from the Keyserling Collection which has not been found, and the specimen from Rasa in the South Tyrol is not the holotype; nor can the latter be selected as neotype as it was taken too far from the type locality and Koch was uncertain of its identity. This uncertainty may have been due to the presence, on the specimen from Rasa, of a ventral spine (VaT) on the 15th tibia, a spine which

may be absent in *L. tricuspis* (Eason, 1965) and which Koch did not mention in the original description. Although 15 VaT rarely if ever occurs in *L. melanops*, Meinert (1868) did mention a single variable ventral spine of the 15th tibia in his redescription of *L. bucculentus*, possibly because he based it on examples of *tricuspis* as well as of *melanops*, and this may have led Koch to attach Meinert's name to the specimen from Rasa which he probably examined after he had read Meinert's paper.

Stuxberg's (1871) description of *L. bucculentus* is general enough to include all species of *Lithobius* with more than seven ocelli on each side, 2 + 2 prosternal teeth, and posterior projections on T.9, 11 and 13; he included all the nominal species known to him which are embraced by this definition in his synonymy. Meinert's (1868) and Haase's (1880) descriptions of this species are identical with each other, much more restricted than Stuxberg's, and more likely to refer almost exclusively to *L. melanops*. Latzel (1880: 74) gave a full description of *L. glabratus* (= *melanops*) and proposed *L. bucculentus* as a synonym. But it is fairly certain that all these authors were mistaken and that *L. bucculentus* is the senior synonym of *L. tricuspis* Meinert, 1872. However, the name has not been used for well over fifty years and to revive it would cause confusion. It is intended therefore to ask the International Commission on Zoological Nomenclature to use its plenary powers to suppress the name *bucculentus* L. Koch 1862 as published in the binomen *Lithobius bucculentus* L. Koch, so as to validate *Lithobius tricuspis* Meinert.

30. *Lithobius melanocephalus* C. L. Koch

Lithobius melanocephalus C. L. Koch in L. Koch, 1862 : 58, fig. 21. C. L. Koch, 1863, 1 : 130, fig. 120a & b.

TYPE LOCALITY. Ehrenbürg, Franconian Jura.

MATERIAL EXAMINED. "*L. melanocephalus* [rewritten]" "Ehrenbürg" B.M. (N.H.) Reg. no. 13.6.18.384-385. A male and female of *L. melanops*.

TYPE SPECIMENS. The original description of *L. melanocephalus* was based on a male and a female and the above two examples of *L. melanops* are undoubtedly the syntypes.

REMARKS. L. Koch attributed this species to his father and the later description (C. L. Koch, 1863) was no doubt made from one of C. L. Koch's specimens: but the first description to be published, based on L. Koch's two specimens, must stand as the original. There is no reason to suppose that C. L. Koch's illustration of *L. melanocephalus* refers to *L. dentatus* as Latzel (1880 : 76) suggested; in this figure (C. L. Koch, 1863: fig. 120a) the tergal projections do indeed resemble those of *L. dentatus* but the antennae are only two-fifths of the body-length with 34 articles which is typical of *L. melanops* and quite unlike *L. dentatus* in which the antennae are about three-fifths of body-length with 50 to 60 articles; C. L. Koch is likely enough to have made a slight error in outlining the shape of the tergites but is much less likely to have been mistaken over the antennae.

The size, the number of ocelli, and the number of coxal pores both in L. Koch's description and in the syntypes are close to the upper normal range for adults of

L. melanops. L. Koch described *L. melanocephalus* as resembling *L. bucculentus* (= *tricuspis*) in having three ventral spines on the 15th femur but differing in having blunt tergal projections; although a third ventral femoral spine (15VpF), which is almost invariable in *L. tricuspis*, is quite common in large specimens of *L. melanops*, it is only present on the left 15th leg of the female syntype (the 15th legs of the male syntype are missing); the tergal projections in the syntypes as in all specimens of *L. melanops* are, of course, noticeably blunter than in *L. tricuspis*.

Meinert (1872) and Haase (1880) suggested *L. melanocephalus* as a possible synonym of *L. bucculentus* under which they were probably describing examples of *L. melanops*. Latzel (1880 : 74), in spite of his doubt about the identity of C. L. Koch's figure had no doubt about L. Koch's description and was the first to propose *L. melanocephalus* as a synonym of *L. glabratus* (= *melanops*).

31. *Lithobius venator* L. Koch

Lithobius venator L. Koch, 1862 : 59, fig. 22.

TYPE LOCALITY. Ehrenbürg, Franconian Jura.

MATERIAL EXAMINED. "L. venator [rewritten]" "Ehrenbürg" B.M.(N.H.) Reg. no. 13.6.18.620. A female of *L. melanops* 13 mm long.

"L. venator [rewritten]" "Nürnberg" B.M.(N.H.) Reg. no. 13.6.18.621-629. Ten more or less mutilated specimens of *L. nigrifrons* Latzel and Haase.

"L. venator [rewritten]" "[?]" B.M.(N.H.) Reg. no. 13.6.18.630-631. A male and a female of *L. melanops*.

"nigrifrons? venator?, Nürnberg" B.M.(N.H.) Reg. no. 13.6.18.570-573. Four mutilated 1st post-larval stadia of *L. melanops*.

TYPE SPECIMEN. The original description of *L. venator* was based on a single female and although the above female of *L. melanops* from Ehrenbürg has 36 antennal articles (Koch gave 38) and 1 + 4, 4, 2 ocelli (Koch gave 1 + 4, 4, 3 and figured 1 + 4, 3, 2) it agrees with this description in other respects and is undoubtedly the holotype.

REMARKS. Koch distinguished this form from *L. melanocephalus* by the fewer ocelli and the absence of the third ventral spine on the 15th femur, and from *L. velox* by the shape of the internal margins of the tergal projections; none of these characters has any taxonomic significance. Koch's labelling of examples of *L. nigrifrons* as *L. venator* is not surprising as this species answers equally well to the original description of *L. venator* and Latzel (1880 : 73) suspected that *nigrifrons* and *venator* might be identical. But Koch, in private correspondence with Latzel (Latzel, 1880 : 73), confirmed that his three specimens of *L. venator* (no doubt the holotype and the two specimens from an indecipherable locality) had accessory apical claws on the 15th legs, claws which are present in *L. melanops* but not in *L. nigrifrons*.

The identity of *L. venator* has not hitherto been definitely established. Meinert (1868) suggested it as a possible synonym of *L. bucculentus* (i.e. *L. melanops*). Stuxberg (1871) gave the same synonymy but also included such diverse species as

L. dentatus, *L. agilis* and *L. intrepidus* Meinert as synonyms so one cannot be sure which species he had in mind. Latzel (1880 : 74) suggested *L. venator* as a possible synonym of *L. glabratus* (= *melanops*) but he was not altogether satisfied as to its identity. The only descriptions of species under *L. venator* L. Koch, other than the original, are those of Porat (1869) and Sseliwanoff (1880); these are both difficult to interpret but they probably refer to *L. melanops*. Attems (1927) regarded *venator* as a subspecies of *L. melanops* without the accessory apical elaw on the 15th leg, but this use of the name is quite wrong. *L. venator* is definitely a synonym of *L. melanops*.

32. *Lithobius minimus* L. Koch

Lithobius minimus L. Koch, 1862 : 61, fig. 23.

TYPE LOCALITY. Germany.

MATERIAL EXAMINED. "L. minimus [rewritten]" "Mögeldorf [near Nuremberg], [hab.] Erlenwälddren" B.M.(N.H.) Reg. no. 13.6.18.386. A female 3rd post-larval stadium 6.4 mm long with both 15th legs missing. This specimen belongs to one of the *lapidicola-borealis* group of species characterized by rather feeble posterior projections on T.11 and 13 only; it may very tentatively be referred to *L. salicis* Verhoeff, but the absence of the 15th legs and the immaturity of the specimen make definite identification impossible.

REMARKS. The original description of *L. minimus* disagrees altogether with the above specimen which has 35 antennal articles (Koch gave 22), 1 + 4, 3, 1 ocelli (Koch gave 1 + 2, 1), 2, 2, 2, 2 coxal pores (Koch gave 1, 1, 1, 1), and 0, 1, 3, 2, 1 ventral spines on the 14th leg (Koch gave 0, 0, 1, 1, 0 on the 15th). The extent of this disagreement can hardly be accounted for by a careless description and the specimen must have been labelled in error by Koch himself or during some rearrangement of his Collection.

Latzel did not deal with this species but Meinert (1872) suggested *L. minimus* as a possible synonym of *L. bucculentus* (i.e. *L. melanops*). Koch's description, however, agrees better with the 1st post-larval stadium of *L. agilis*. But there can be no certainty about the identity of *L. minimus* and it should be rejected as a *nomen dubium*.

33. *Lithobius immutabilis* L. Koch

Lithobius immutabilis L. Koch, 1862 : 62, fig. 24.

TYPE LOCALITY. Germany.

MATERIAL EXAMINED. "Lithobius immutabilis L. Koch, Syntypen, Nürnberg, leg. L. Koch [rewritten]" Zool. Mus. Berlin: Kat. Nr. 331. Two mutilated 1st post-larval stadia of *L. dentatus*.

"L. immutabilis [rewritten]" "Mögeldorf [near Nuremberg], [hab.] Erlengebüsch" B.M.(N.H.) Reg. no. 13.6.18.322-325. A 4th larval stadium and four 1st post-larval stadia of *L. dentatus*, all more or less mutilated.

TYPE SPECIMENS. The original description of *L. immutabilis* was based on a number of specimens and all the above examples of *L. dentatus* seem to belong to the syntypical series.

REMARKS. Koch's description is clearly of a series of immature specimens and applies equally well to a number of species. Meinert (1872) and Latzel (1880 : 74) suggested *L. immutabilis* as a possible synonym of *L. bucculentus* (i.e. *L. melanops*) and *L. glabratus* (= *melanops*) respectively. Only Haase (1880), who may well have seen the original material, suggested its true synonymy with *L. dentatus*.

34. *Lithobius macilentus* L. Koch

Lithobius macilentus L. Koch, 1862 : 63, fig. 25.

TYPE LOCALITIES. Nuremberg; Franconian Jura; Bolzano, Italy.

MATERIAL EXAMINED. "Lithobius macilentus L. Koch, Syntypen?, Nürnberg, leg. L. Koch [rewritten]" Zool. Mus. Berlin: Kat. Nr. 332. A female of *L. erythrocephalus* and two very mutilated specimens, a male and a female, probably 4th post-larval stadia of *L. mutabilis*.

"L. macilentus [rewritten]" "[hab.] Valzner Weiher, Gritz [Grütz, near Nürnberg]" B.M.(N.H.) Reg. no. 13.6.18.380-382. Two female 3rd post-larval stadia of *L. aulacopus* Latzel with 37 and 35 antennal articles respectively, together with one 1st post-larval stadium of *L. tricuspis* with 26 antennal articles, all three more or less mutilated.

"L. macilentus [rewritten]" "macilentus, Botzen [Bolzano]" B.M.(N.H.) Reg. no. 13.6.18.383 (part). A mutilated 1st post-larval stadium of *L. tricuspis* with antennae missing.

"L. macilentus [rewritten]" "Happurg [Franconian Jura]" B.M.(N.H.) Reg. no. 13.6.18.383 (part). A badly mutilated fragment barely recognizable as belonging to a species of *Lithobius*.

TYPE SPECIMENS. The original description of *L. macilentus* was obviously based on two different species and there is no doubt that the above specimens from Grütz and Bolzano, and possibly also the fragment from Happurg, belong to the syntypical series. The same cannot be said of those in the Berlin Museum which bear no resemblance to Koch's description and must have been labelled by mistake. That part of Koch's description applying to the larger specimens with more than 32 antennal articles (females) together with his figure of the ocelli clearly refers to an immature example of *L. aulacopus*; the least defective of these, a 3rd post-larval stadium 8mm long with 37 antennal articles, answering exactly to Koch's description of the larger form and also to Latzel's (1880 : 85) description of the "juvenis" of *L. aulacopus*, is here formally designated as the lectotype (B.M.(N.H.) 13.6.18.380).

REMARKS. Meinert (1872) suggested *L. macilentus* as a possible synonym of *L. agilis*. Fedrizzi (1877) gave a rather diffuse account of the species which is more than mere repetition of Koch's description and, although probably composite, seems to include *L. aulacopus*. Latzel (1880 : 80) recognised the inclusion of immature examples of two separate species by Koch in his original description of *L. macilentus*

and, probably following Meinert, proposed *L. agilis* as the senior synonym to apply only to the smaller specimens with fewer than 32 antennal articles which Koch regarded as males; he made no suggestion as to the identity of the larger females with more than 32 antennal articles and dismissed Koch's description and figure of the ocelli as unreliable, going on to describe *L. aulacopus* as a new species (Latzel, 1880 : 84).

Meinert's and Latzel's failure to guess the identity of the smaller specimens is quite understandable but both of them overlooking Koch's very adequate description of the larger females is surprising. Haase (1880) followed Latzel's synonymy and all subsequent authors have accepted *L. macilentus* as a synonym of *L. agilis*.

Lohmander (1957 and *in litt.*) pointed out that *L. aulacopus* is a junior synonym of *L. intrepidus* Meinert, 1868. Most authors, however, continue to use the name *aulacopus* and the nomenclature of this species is unsatisfactory: it should now be known as *L. macilentus* L. Koch.

35. *Lithobius alpinus* L. Koch

Fig. 3

Lithobius alpinus L. Koch, 1862 : 66, fig. 27.

TYPE LOCALITY. Seiseralpe, an alpine hut in the Italian Tyrol.

MATERIAL EXAMINED. "Lithobius alpinus in Seiseralpe leg. Gredler" B.M.(N.H.) Reg. no. 13.6.18.12. A female of *L. lucifugus* L. Koch 15 mm long with oval coxal pores and most of the legs missing.

TYPE SPECIMEN. The original description of *L. alpinus* was based on a single defective female and agrees exactly with the above specimen of *L. lucifugus* which is undoubtedly the holotype.

REMARKS. Koch used the shape of the coxal pores as a key character, separating those forms such as *L. alpinus* with oval coxal pores from species in which the pores are circular. Latzel (1880 : 122) realised that these pores may be either circular or oval in *L. lucifugus* and suggested *L. alpinus* as a possible synonym of this species. Borek (1967) argued that *L. alpinus* must be a species distinct from *L. lucifugus* owing to its small number of antennal articles (30), but this argument is not justified; the number of antennal articles is very variable in *L. lucifugus* as Borek himself pointed out.

The holotype shows a pair of small paramedian prosternal teeth not noted by Koch, in addition to the usual 2 + 2 (Fig. 3). These extra teeth are characteristic of *L. lucifugus* var. *latzeli* Verhoeff, 1935 which Verhoeff (1937) later raised to a subspecies; but the form and number of prosternal teeth in *lucifugus* are very variable, even in examples from the same locality, and there is no justification for regarding *latzeli* as a subspecies. Should it be thought necessary to give varietal status to specimens with these extra prosternal teeth, the name *latzeli* Verhoeff should be used, since the name *alpinus* must be rejected as a junior homonym of *Lithobius alpinus* Heer, 1845, which refers to an immature specimen of uncertain identity from the Swiss Alps.

36. *Lithobius granulatus* L. Koch

Lithobius granulatus L. Koch, 1862 : 67, fig. 28.

TYPE LOCALITY. Unknown.

MATERIAL EXAMINED. "Lithobius granulatus L.K." "Patria?" B.M.(N.H.) Reg. no. 13.6.18.258. A male of *L. lucifugus* 19 mm long with oval coxal pores and with both antennae and all the legs missing.

TYPE SPECIMEN. The original description of *L. granulatus* was based on a single male with antennae and legs missing and agrees exactly with the above specimen of *L. lucifugus* which is undoubtedly the holotype.

REMARKS. As in the case of *L. alpinus* the oval coxal pores of *L. granulatus* were used by Koch as a key character. The only trace of an appendage borne by the holotype consists of the first and second articles of the right antenna, the second of which appears unusually elongate, and it was this slight aberration which led Koch to regard *L. granulatus* as a species distinct from *L. alpinus*. There is no previously proposed synonymy for this form and very little mention of it in the literature. Sseliwanoff's (1880) description of *L. granulatus* L. Koch refers to some species other than *L. lucifugus*. *L. granulatus* Meinert, 1872 is a homonym referring to a South American species.

37. *Lithobius crassipes* L. Koch

Lithobius crassipes. L. Koch, 1862 : 71, fig. 31.

TYPE LOCALITY. Nuremberg district.

MATERIAL EXAMINED. "Lithobius crassipes L. Koch, Syntypen?, Franconia (Jura), leg. L. Koch [rewritten]" Zool. Mus. Berlin: Kat. Nr. 340. A male and two females.

"No. 272 *Lithobius crassipes* L.K. Types [rewritten]" "fränk. Jura" B.M.(N.H.) Reg. no. 13.6.18.98-110. Four males and nine females ranging in the degree of their maturity from 3rd post-larval stadia to adults.

"crassipes, Nürnberg" B.M.(N.H.) Reg. no. 13.6.18.259-261. A male and a female together with a female of *L. curtipes*.

TYPE SPECIMENS. The original description of *L. crassipes* was based on a number of specimens of both sexes. All the above specimens from the Franconian Jura, much of which lies in the Nuremberg district, seem to belong to the syntypical series, but those labelled "Nürnberg" were probably added to the Collection after the description had been written. A well-preserved adult female 8.5 mm long answering to Latzel's (1880 : 128) description of *L. crassipes* is here formally designated as the lectotype (B.M.(N.H.) 13.6.18.98).

REMARKS. The single female of *L. curtipes* from Nuremberg does not show the characteristic arrangement of the ocelli very clearly, so it is not surprising that Koch should have included it among his specimens of *L. crassipes*.

38. *Lithobius sulcatus* L. Koch

Fig. 4

Lithobius sulcatus L. Koch, 1862 : 73, fig. 32.

TYPE LOCALITY. Nuremberg.

MATERIAL EXAMINED. "L. sulcatus [rewritten]" "Happurg [Franconian Jura]" B.M.(N.H.) Reg. no. 13.6.18.599-600. A male 2nd post-larval stadium of *L. agilis* and another immature male, probably a 2nd post larval stadium of *L. crassipes*.

"L. sulcatus [rewritten]" "Grütz [Grütz], [hab.] Wälddren bin. Glaishammer" B.M.(N.H.) Reg. no. 13.6.18.601-607. Three specimens answering to Koch's description of *L. sulcatus* together with a female 3rd post-larval stadium of *L. aeruginosus* and three other immature specimens, probably a 1st post-larval stadium and female 2nd post-larval stadium of *L. curtipes* and a 1st post-larval stadium of *L. crassipes*.

TYPE SPECIMENS. The original description of *L. sulcatus* was based on a number of immature specimens and all those from Grütz, near Nuremberg, some of which bear only a superficial resemblance to one another, seem to belong to the syntypical series. One of those answering to Koch's description is here formally designated as the lectotype (B.M.(N.H.) 13.6.18.601).

REMARKS. Koch can have examined only three specimens at all carefully when writing his description of *L. sulcatus*; most of the others labelled "*L. sulcatus*" agree with this description in a few characters only and the example of *L. agilis* not at all. Latzel did not deal with the species, there is little reference to it in the literature, and it has never been redescribed although Attems (1909) referred it to the subgenus *Monotarsoobius*. The following description is based on the lectotype and the other two specimens from Grütz with which it is conspecific.

DESCRIPTION. *Length*: 4.6 to 4.8 mm. *Antennae*: 1.4 to 1.5 mm long; of 21 or 22 articles. *Ocelli*: 3 or 4; a relatively small posterior ocellus, a rather larger intermediate one and one or two much smaller anterior ocelli (Fig. 4). *Prosternum*: with 2 + 2 teeth and a pair of well-developed lateral spines. *Tergites*: slightly wrinkled; general shape as in species of *Monotarsoobius* with posterior angles of T.9, 11 and 13 obtusely rounded. *Coxal pores*: 1, 1, 1, 1. *Legs*: tarsus and metatarsus fused on 1st to 11th; the 14th and 15th moderately thickened; 15th accessory apical claw present. *Genitalia*: undeveloped.

Spinulation:

	Ventral					Dorsal				
	C	t	P	F	T	C	t	P	F	T
1	—	—	—	—	m	—	—	—	—	(a)
2	—	—	—	—	m	—	—	—	—	(a)
3	—	—	—	—	m	—	—	—	p	(a)
4	—	—	—	—	m	—	—	—	p	(a)
5	—	—	—	m	m	—	—	—	a-p	a-p
6	—	—	—	m	m	—	—	—	a-p	a-p
7	—	—	—	m	m	—	—	—	a-p	a-p

Spinulation:

	Ventral					Dorsal				
	C	t	P	F	T	C	t	P	F	T
8	—	—	—	m	m	—	—	—	a-p	a-p
9	—	—	—	m	m	—	—	—	a-p	a-p
10	—	—	—	m	m	—	—	(p)	p	—
11	—	—	—	m	m	—	—	p	(p)	—
12	—	—	m	m	m	—	—	(mp)	(p)	—
13	—	—	m	m	—	—	—	—	—	—
14	—	—	m	m	—	—	—	—	—	—
15	—	—	m	m	—	—	—	—	—	—

The letters enclosed in brackets indicate variable spines.

IDENTITY. These specimens are 1st post-larval stadia of a species of *Monotarsobius* which, in its adult form, would certainly have antennal articles considerably in excess of twenty. They would therefore answer to *L. microps* Meinert, 1868 (= *L. duboscqui* Brolemann), one of the few species of *Monotarsobius* with more than twenty antennal articles and a 15th accessory apical claw, were it not for the presence of such spines as DaF and DpF which are rarely found even in adults of *L. microps* (see also Jeekel, 1964). Verhoeff (1931, 1934, 1937) attached the name *microps* to one or more European species of *Monotarsobius* which differ from the true *microps* in having a more profuse spinulation. In using the name in this way Verhoeff was following Meinert who, in his redescription of *L. microps* (Meinert, 1872), included at least one other species in addition to the true *microps*. But in spite of "*L. microps*" figuring in numerous keys and brief descriptions it seems never to have been properly described except by Brolemann (1930), and there is some doubt as to whether Brolemann was describing the same species as Verhoeff. On the other hand a bewildering number of subspecies of "*microps*" have been described by Verhoeff and other authors from various parts of Europe, some in considerable detail. Although the specimens of *L. sulcatus* may possibly be examples of *L. microps* with unusual spinulation, they are more likely to be identical with the misnamed "*L. microps*" of Verhoeff or one of its subspecies. But a full description of the species must await discovery of adults in the neighbourhood of Nuremberg.

39. *Lithobius aeruginosus* L. Koch

Lithobius aeruginosus L. Koch, 1862 : 74, fig. 33.

TYPE LOCALITY. Nuremberg district.

MATERIAL EXAMINED. "*Lithobius aeruginosus* L.K." "fränk. Jura" B.M.(N.H.) Reg. no. 13.6.18.1. A male 4th post-larval stadium 5.8 mm long.

"*Lithobius aeruginosus* L.K." B.M.(N.H.) Reg. no. 13.6.18.2. A male 4th post-larval stadium of *L. curtipes* 7 mm long.

TYPE SPECIMENS. The original description of *L. aeruginosus* was based on at least two males and the above two specimens seem to be the syntypes. The one labelled "fränk. Jura" answers more closely to this description and also agrees with Latzel's (1880 : 126) description of *L. aeruginosus*; it is here formally designated as the lectotype (B.M.(N.H.) 13.6.18.1).

REMARKS. Although both the above specimens have three ventral spines on the 15th prefemur (Koch gave one) they answer fairly well to Koch's description in other respects. The male of *L. curtipes*, however, has the characteristic tibial projection feebly but quite distinctly developed on the 15th leg, a second ventral spine (VaF) on the 15th femur, and the ocelli, though not arranged as in adults of *L. curtipes*, are in a somewhat irregular line and not in a precisely straight line as in the lectotype: Koch evidently overlooked all these details and seems to have depended more on the lectotype for his description.

The 15th legs of the lectotype are unusually long for this species (two-fifths of the body-length), a feature noted by Koch and attributed by Latzel (1880 : 128) to immaturity. But Koch regarded it as characteristic of the species and this may have led him to identify the other examples of *L. aeruginosus* in the Collection, all of which have relatively short legs, as *L. curtipes* or *L. sulcatus*.

40. *Lithobius mutabilis* L. Koch

Lithobius variegatus: C. L. Koch, 1844 : 21, fig. 21. 1863, 2 : 21, fig. 144a & b (non Leach 1814).

Lithobius mutabilis L. Koch, 1862 : 75, fig. 34.

TYPE LOCALITY. Germany.

MATERIAL EXAMINED. "Lithobius mutabilis L. Koch, Syntypen?, Nürnberg, leg. L. Koch [rewritten]" Zool. Mus. Berlin: Kat. Nr. 329. Four males and four females together with a female of *L. muticus*, all more or less mutilated.

"L. mutabilis [rewritten]" "fränk. Jura" B.M.(N.H.) Reg. no. 13.6.18.435-458. Five males and nine females together with five males and three females of *L. pelidnus* and a male and female of *L. muticus*.

"mutabilis, fränk. Jura" B.M.(N.H.) Reg. no. 13.6.18.459-460. Two males of *L. erythrocephalus*.

"mutabilis, Nürnberg" B.M.(N.H.) Reg. no. 13.6.18.461-520 (part). Twenty-four males (including 3rd and 4th post-larval stadia) and twenty-three females together with seven males and five females of *L. pelidnus* and an adult male, a male 3rd post-larval stadium and eight females of *L. muticus*.

"L. mutabilis [rewritten]" "Nürnberg—Einlegend ♀ mit Ei" B.M.(M.H.) Reg. no. 13.6.18.461-520 (part). A single female.

"L. mutabilis [rewritten]" "München" B.M.(N.H.) Reg. no. 13.6.18.521-526. A female 4th post-larval stadium of *L. mutabilis*, a male and a female of *L. muticus*, two females of *L. lapidicola* Meinert (*sensu* Jeekel, 1964 non Latzel, 1880), and two rather defective females, probably belonging to *L. subtilis* Latzel.

"mutabilis, Tirol" B.M.(N.H.) Reg. no. 13.6.18.527. A single male.

"L. mutabilis [rewritten]" "Böhmen [Bohemia]" B.M.(N.H.) Reg. no. 13.6.18.528-531. Two males and two females.

"mutabilis, Franzensbad [Frantiskovy Lazne, Czechoslovakia]" B.M.(N.H.) Reg. no. 13.6.18.632. A single male.

TYPE SPECIMENS. The original description of *L. mutabilis* was based on two distinct species, *L. mutabilis* as described by Latzel (1880 : 97) and *L. pelidnus*

Haase, 1880. The specimens in the Berlin Museum and those in the British Museum (N.H.) from the Franconian Jura (13.18.6.435-458) all seem to belong to the syntypical series and a well-preserved male 10 mm long agreeing with Latzel's description of *L. mutabilis* is here formally designated as the lectotype (B.M.(N.H.) 13.6.18.435).

REMARKS. L. Koch intended his description of *L. mutabilis* to apply to *L. variegatus* Leach as described by C. L. Koch in 1844 and he renamed it because he realised that Leach's (1814) description referred to an altogether different species. Although one cannot say whether C. L. Koch had before him examples of the species now recognized as *L. mutabilis*, those of *L. pelidnus*, or a mixture of the two when he wrote his description of *L. variegatus*, and his illustration of the latter (C. L. Koch, 1863: fig. 144) could apply to either species, the obvious course is to select a specimen of the former as lectotype in order to preserve current nomenclature.

Females of *L. mutabilis* and *L. pelidnus* are very difficult to distinguish from one another and it has already been shown how L. Koch came to confuse them with those of *L. muticus* (see p. 117), so most of his misdeterminations are easily explained: but the two males of *L. erythrocephalus* from the Franconian Jura and the two unexpected species from Munich bear only a superficial resemblance to *L. mutabilis* and cannot have been examined very carefully.

Folkmanova (1949) pointed out that many of the infraspecific forms of *L. mutabilis* enumerated and keyed by Verhoeff (1935) are based on unstable characters and are therefore without validity. Of Koch's specimens, the single male from the Tyrol is quite without posterior projections on T. 11 and 13 and agrees in other respects with Verhoeff's definition of *L. mutabilis mutabilis*; but all his other specimens including the lectotype have at least traces of posterior projections on T. 11 and small but quite distinct projections on T. 13, and would therefore run to *L. mutabilis* var. *carpathicus* in Verhoeff's key.

Although *L. mutabilis* and *L. pelidnus* are both fairly adequately described by Latzel (1880), the best descriptions of these two species, which are accompanied by illustrations of the male 15th legs upon which their differentiation largely depends, are those of Matic (1966).

41. *Lithobius cinnamomeus* L. Koch

Lithobius cinnamomeus L. Koch, 1862: 77, fig. 35.

TYPE LOCALITY. Germany.

MATERIAL EXAMINED. "Lithobius cinnamomeus L.K." "Happurg [Franconian Jura]" B.M.(N.H.) Reg. no. 13.6.18.60-63. Two males and two females, all either 4th post-larval stadia or small adults of *L. muticus*.

TYPE SPECIMENS. The original description of *L. cinnamomeus* was based on a number of specimens of both sexes and all the above examples of *L. muticus* definitely belong to the syntypical series.

REMARKS. As well as describing this form as being smaller, paler, and with fewer antennal articles and fewer ocelli than *L. muticus*, Koch noted the incurved internal pair of spurs on the female gonopods which he contrasted with the straight spurs

which he believed, mistakenly as we have seen, to occur in *L. muticus* (see p. 117). Although he made no mention of the swelling on the male 14th tibia in his description, he did confirm its presence in *L. cinnamomeus* in private correspondence with Latzel (Latzel, 1880 : 119). Latzel proposed *L. cinnamomeus* as a possible synonym of *L. muticus* but he remarked on the large head of the latter compared with the relatively small head of the former, and suggested that the two might possibly prove to be distinct species. But it is only in the largest males of *L. muticus* that the shape of the cephalic shield is really distinctive and there is no doubt that *L. cinnamomeus* is a synonym of *L. muticus*.

42. *Lithobius lucifugus* L. Koch

Fig. 5

Lithobius lucifugus L. Koch, 1862 : 82, fig. 38.

TYPE LOCALITY. Bolzano, Italy.

MATERIAL EXAMINED. "L. lucifugus [rewritten]" "Botzen [Bolzano]" B.M.(N.H.) Reg. no. 13.6.18.369. A single male 15 mm long with circular coxal pores.

"L. lucifugus [rewritten]" "Ratzes [Rasa, Italy], [leg.] Milde" B.M.(N.H.) Reg. no. 13.6.18.370. A female of *L. pelidnus*.

"lucifugus?, Nurnberg" B.M.(N.H.) Reg. no. 13.6.18.371. A male 3rd post-larval stadium of *L. mutabilis*.

"L. lucifugus? cinnamomeus? Tirol [rewritten]" B.M.(N.H.) Reg. no. 13.6.18.372. Two males and three females of *L. lucifugus*.

TYPE SPECIMEN. The original description of *L. lucifugus* was based on a single male and agrees exactly with the above male from Bolzano which is undoubtedly the holotype.

REMARKS. The circular coxal pores of the holotype explain why *L. lucifugus* is so far removed, in Koch's system, from *L. alpinus* and *L. granulatus* with which it is conspecific (see p. 130). The prosternum of the holotype (Fig. 5) with 2 + 2 teeth establishes this number of teeth as typical, but the appearance of 2 + 3 prosternal teeth on one of the specimens from the Tyrol is evidence of their variability in *L. lucifugus*. Koch's inclusion of a female of *L. pelidnus* under *L. lucifugus* is a further example of the mistakes he made in placing females of similar species.

L. lucifugus was fully described by Latzel (1880 : 120) and Brolemann (1930).

43. *Lithobius lubricus* L. Koch

Lithobius lubricus L. Koch, 1862 : 86, fig. 41.

TYPE LOCALITY. Nuremberg district.

MATERIAL EXAMINED. "L. lubricus [rewritten]" "fränk. Jura" B.M.(N.H.) Reg. no. 13.6.18.373-374. Three post-larval stadia of *L. calcaratus*, one belonging to the 1st, a male to the 2nd and a female to the 3rd.

"L. lubricus [rewritten]" "Dietenhofen [Franconian Jura]" B.M.(N.H.) Reg. no. 13.6.18.375. A male 3rd post-larval stadium of *L. calcaratus*.

"*L. lubricus* [rewritten]" "Gritz [Grütz, near Nuremberg], [hab.] Valzn. Weiher, Glaishammer" B.M.(N.H.) Reg. no. 13.6.18.376-379. Four post-larval stadia of *L. calcaratus*, one belonging to the 1st, and two males and a female to the 3rd.

TYPE SPECIMENS. The original description of *L. lubricus* was based on a number of specimens of both sexes. All the above examples of *L. calcaratus* come from the neighbourhood of Nuremberg and seem to belong to the syntypical series.

REMARKS. Koch's failure to identify these specimens as *L. calcaratus* is easily understood, as the characteristic femoral process on the male 15th leg does not become obvious during the development of this species until the 4th post-larval stadium (see p. 109). Synonymy of *L. lubricus* with *L. calcaratus* was first proposed by Stuxberg (1871) and has never been disputed.

44. *Lithobius carinatus* L. Koch

Fig. 6

Lithobius carinatus L. Koch, 1862 : 87, fig. 42.

TYPE LOCALITY. Greece.

MATERIAL EXAMINED. "*Lithobius carinatus* L.K." "Griechenland" B.M.(N.H.) Reg. no. 13.6.18.56-58. Three imperfectly cleared males with the antennae and all the legs missing.

"*Lithobius carinatus* L.K." "Patria?" B.M.(N.H.) Reg. no. 13.6.18.59. A single well-preserved male.

TYPE SPECIMENS. The original description of *L. carinatus* was based on a number of males. The above specimens from Greece seem to constitute the syntypical series and must have been examined by Koch before they lost their appendages. One of them, a male 24 mm long, is here formally designated as the lectotype (B.M.(N.H.) 13.6.18.56).

REMARKS. All the above specimens as well as Koch's description are clearly referable to the common Greek species known as *L. macrops* Karsch, 1888. Although this description is quite adequate it has been overlooked by most authors: only Attems (1926) has recognized *L. carinatus* as the correct name for *L. macrops*.

The striking difference between the relatively dense setae on the 15th prefemur and femur, and the very much sparser setae on the corresponding tibia, tarsus and metatarsus which Koch described, cannot be confirmed in the type specimens owing to their mutilation, but is present in the male from an unknown locality. However, three males and a female of this species (B.M.(N.H.) Reg. no. 89.3.29.36-38) from Athens, the type locality of *L. macrops*, are variable in respect of this character: one male and the female are similar to Koch's specimens but with more setae at the base of the 15th tibia, whereas the other two males have setae of much the same density on all the articles of the 15th legs: none of these specimens from Athens shows the

sharp difference between the setae of the femur and tibia which is so striking in Koch's specimen. It would, in fact, be quite reasonable to regard *L. carinatus* and *L. macrops* as subspecifically distinct if we knew the exact localities in Greece attaching to *L. carinatus* and if it were not for other specimens of the species (B.M.(N.H.) Reg. nos. 1905.8.24.77 and 03.8.25.23-25) from unknown localities in Greece showing various degrees of differentiation between the more setose proximal and the almost glabrous distal articles of the 15th legs. Further, Matic figured a specimen of *L. macrops* from Athens with a glabrous 15th metatarsus (Matic *et al.*, 1968: fig. 1B). *L. carinatus* should, therefore be regarded as the senior synonym of *L. macrops*.

Although this is an abundant and distinctive species the only really full account in the literature is that of Matic (Matic *et al.*, 1968), and because Koch's specimens differ in detail from that account they are described below. The characters of the appendages are taken from the specimens from an unknown locality.

DESCRIPTION. *Size:* 20 to 25 mm long and about 2.5 mm broad at T.10. *Colour:* dull yellow. *Head:* broader than long. *Antennae:* one-third of body-length; of 32 irregular articles, some broader than long, others slightly elongate, appearing only very sparsely setose although many of the setae may have been lost. *Ocelli:* a large posterior ocellus, an intermediate ocellus of much the same size and two much smaller anterior ocelli, exactly as figured by Matic (Matic *et al.*, 1968: fig. 1E); organ of Tömösvary rather smaller than smallest ocellus. *Prosternum:* with 2 + 2 teeth and a pair of lateral spines; lateral to the lateral spine the anterior border forms a narrow but distinct shoulder, sometimes amounting to a rounded node (Fig. 6). *Tergites:* the posterior angles of the large tergites all rounded, those of T.9 obtuse, those of T.11 right-angled and those of T.13 very slightly produced; T.14 relatively broad; intermediate tergite (T.16) truncate. *Sternites:* S.5 to S.15 beset with minute setae; many of these setae have been lost but their insertions are visible. *Coxal pores:* 4, 3, 3, 3; circular; the medial pore on the 12th coxa is much smaller than the others and may be hidden by the adjacent sternite. *Legs:* the 14th and 15th short and stout, less than one-third of body-length; 15th prefemur and femur densely setose; the three distal articles of the 15th leg almost glabrous; setae of the 14th leg arranged in much the same way as on the 15th, but their differentiation is less marked; two ventral rows of stout seriate setae on the 1st to 13th metatarsi, extending onto part of the adjacent tarsus in some legs; 15th accessory apical claw about two-fifths of length of the principal claw which is short and stout. *Gonopods:* of a single article.

Spinulation:

	Ventral					Dorsal				
	C	t	P	F	T	C	t	P	F	T
14	—	m	amp	amp	am	—	—	mp	p	p
15	—	m	amp	am	—	—	—	p	p	—

No coxolateral spines. All spines rather short and stout. Koch recorded a third ventral spine on the 15th femur and a single ventral spine on the 15th tibia.

45. *Lithobius pubescens* L. Koch

Lithobius pubescens L. Koch, 1867 : 898.

TYPE LOCALITY. Tinos, Aegean Archipelago.

MATERIAL EXAMINED. "L. pubescens [rewritten]" "Tinos Erber" B.M.(N.H.) Reg. no. 13.6.18.580. A male of *L. carinatus* 18 mm long.

"L. pubescens [rewritten]" "Syra Erber" B.M.(N.H.) Reg. no. 13.6.18.581-582. A male and a female of *L. carinatus* 16 mm and 12 mm long respectively.

"L. pubescens [rewritten]" "Smyrna Erber" "181 [printed]" B.M.(N.H.) Reg. no. 13.6.18.583-585. A male and two females of *L. carinatus* 16 to 19 mm long.

TYPE SPECIMEN. The original description of *L. pubescens* was based on a male and a female. The latter has not been found but the above male of *L. carinatus* from Tinos agrees exactly with the description and is here formally designated as the lectotype.

REMARKS. Although Koch made no comparison between *L. pubescens* and *L. carinatus*, his brief description of the former is quite clear and Karsch (1888) remarked on the similarity between *L. pubescens* and *L. macrops* (= *carinatus*). The principal features which seem to have led Koch to describe *L. pubescens* as a distinct species are, as its name implies, the strongly setose antennae and 15th legs and the numerous minute setae on the posterior sternites of the male. The distal articles of the legs, particularly those of the 14th and 15th, of the lectotype and the specimens from Syria and Smyrna are certainly more densely setose than those of the Greek specimens of *L. carinatus*, but there is little true difference between the two groups of specimens in the setation of the antennae and the extent and density of the sternal setae. Most of these setae have been lost in Koch's specimens of *L. carinatus* and may not have been present even when he examined them originally. There would, in fact, be little reason for regarding *pubescens* as distinct from *carinatus* were it not for a marked difference in size.

Of the published figures for the lengths of Greek specimens, Karsch (1888) gave 23 mm, Verhoeff (1890) gave 20.5 to 21.5 mm and Matic (Matic *et al.*, 1968) gave 22 to 30 mm; Koch's specimens of *L. carinatus* are 20 to 25 mm and the other adult Greek specimens in the British Museum (N.H.) already referred to are 21 to 25 mm long; two smaller females (B.M.(N.H.) 03.8.25.24 and 25) from Greece are 13 mm and 14 mm long but they are obviously immature with 3, 3/2, 2, 2 coxal pores and only 2 + 2 very unequal spurs on the gonopods. Comparable figures for the lengths of specimens from Asia Minor and the Levant are that of Porat (1894) for a Syrian specimen (15 mm) and those of Verhoeff (1925, 1941, 1943) for specimens from Jaffa (13 to 14 mm), the Taurus Mountains (15 mm) and Alexandretta (19 mm); and of Koch's specimens of *L. pubescens*, the lengths of which have already been given, the female from Syria only 12 mm long seems to be mature with 4, 3, 3, 3 coxal pores and fully developed gonopods with 3 + 3 spurs.

There seems, therefore, to be some justification for retaining the name *pubescens* for a subspecies of *L. carinatus* occurring in the Aegean Archipelago, Asia Minor and the Levant and differing from the nominate subspecies in being less than 20 mm long

with the tarsi and metatarsi of the legs, particularly those of the 14th and 15th, more strongly setose.

46. *Lithobius litoralis* L. Koch

Lithobius litoralis L. Koch, 1867 : 899.

TYPE LOCALITY. Tinos, Aegean Archipelago.

TYPE SPECIMEN. The holotype. B.M.(N.H.) Reg. no. 13.6.18.368.

REMARKS. This species has been discussed in a previous publication (Eason, 1970a) in which it was shown to be a valid species of *Eupolybothrus* Verhoeff and not a synonym of *E. fasciatus* (Newport) as was previously supposed.

47. *Lithobius nigripalpis* L. Koch

Lithobius nigripalpis L. Koch, 1867 : 899.

TYPE LOCALITY. Tinos, Aegean Archipelago.

MATERIAL EXAMINED. "L. nigripalpis [rewritten]" "Tinos Erber" B.M.(N.H.) Reg. no. 13.6.18.575. A single male.

TYPE SPECIMEN. The original description of *L. nigripalpis* was based on a single male and agrees fairly well with the above specimen which is undoubtedly the holotype.

REMARKS. There has been uncertainty about the identity of this species ever since Verhoeff (1899) redescribed it as a subspecies of *L. forficatus* with either a simple apical claw on the 15th leg or with only a minute accessory claw. In subsequent keys and brief accounts (Verhoeff, 1925, 1937 etc.) the 15th legs of *L. nigripalpis* have always been described as having a simple claw. In fact, not only the holotype but also three specimens (a male and two females) from the Verhoeff Collection in the British Museum (N.H.) labelled "*Lithobius forficatus nigripalpis* Koch, Greece" (Reg. no. 03.8.25.64-66) all have small but distinct 15th accessory apical claws, and there is no doubt that all four specimens belong to *L. bulgaricus* Verhoeff, 1925, which thus becomes a junior synonym of *L. nigripalpis*. It may be that when he wrote his account of *bulgaricus*, Verhoeff had already sold his material belonging to *nigripalpis* to various museums and had no specimens available for re-examination; otherwise he would hardly have described *L. bulgaricus* as distinct.

Having decided that *L. nigripalpis* is identical with *L. bulgaricus* it remains to arrive at its taxonomic status. It clearly belongs to the *piceus-peregrinus* group of species and, contrary to Verhoeff's mistaken conception of the form as having close affinity with *L. forficatus*, most authors have regarded it as no more than a variety or even a synonym of one of the species of this group. Latzel (1880 : 65) included *L. nigripalpis* among the doubtful synonyms of *L. piceus*; Attems (1905) regarded *L. nigripalpis* and *L. peregrinus* as varieties of the same species; and Muralwitsch (1926) believed *L. forficatus nigripalpis* of Verhoeff to be identical with *L. viriatus* Sselivanoff, 1880, another member of the *piceus-peregrinus* group.

Although Matic (1964) proposed *nigripalpis* as a variety of *L. bulgaricus*, he has recently (Matic, 1966; Matic & Darabantu, 1968) listed *L. nigripalpis* among the synonyms of *L. piceus* and described *L. bulgaricus* separately.

L. bulgaricus was originally described as a subspecies of *L. piceus* (Verhoeff, 1925) but Matic (1966) found these two forms to be sympatric in parts of Rumania so they can hardly belong to the same species. *L. nigripalpis* is, in fact, closer to *L. peregrinus* than to *L. piceus* but the absence of a prosternal diastema and the absence of denticles on the claw of the female gonopod (both of which are present in *L. peregrinus*) are sufficient grounds for regarding it as a true species.

The original record from Tinos, Verhoeff's (1899) records from the island of Aegina in the Saronic Gulf and the adjacent mainland of Attica (probably based partly on the specimens B.M.(N.H.) Reg. no. 03.8.25.64-66), Verhoeff's (1925) original record of *L. bulgaricus* from Ruschuk on the Danube, and the distribution Matic (1966) gave for *L. bulgaricus* show this species to be widespread in the eastern and southern Balkans as well as in the Aegean Archipelago. Records of *L. piceus olympicus* Verhoeff from the south Marmoran coast (Verhoeff, 1944), and of *L. politicus* Chamberlin from southwest Anatolia (Chamberlin, 1952), both probably refer to *L. nigripalpis* and suggest that the species is also widespread in Asia Minor. Attem's (1905) description of *L. peregrinus* from Erdschias-Dagh (Asia Minor) and Verhoeff's (1944) description of what he regarded as the true *L. nigripalpis* from Ankara must both have been based on specimens of *nigripalpis* in which the 15th accessory apical claw was either absent or so small as to be overlooked.

The only really full account of this species in the literature is that of Matic (1966) under *L. bulgaricus*. Because the holotype appears to be a pseudomaturus and therefore different in detail from Matic's account it is described below.

DESCRIPTION. *Length*: 19 mm. *Colour*: dark brown. *Antennae*: 8 mm long; of 48 articles. *Ocelli*: 1 + 4, 3, 2. *Prosternum*: with 4 + 4 teeth and the lateral spines lateral to the external teeth. *Tergites*: the posterior angles of T.8 and 10 rounded, those of T.12 blunt, those of T.14 angulated; posterior angles of T.9, 11 and 13 with prominent projections, those of T.13 being very long and sharp; posterior border of intermediate tergite strongly emarginate; the shape of the tergites is in marked contrast to that in *L. piceus* in which the posterior angles of T.10, 12 and 14 are sharp and slightly projecting. *Coxal pores*: 5, 5, 5, 4; circular. *15th legs*: 7 mm long; stout; a feeble external sulcus on prefemur, femur and tibia; accessory apical claw about a quarter the length of principal claw.

Spinulation:

	Ventral					Dorsal				
	C	t	P	F	T	C	t	P	F	T
1	—	—	mp	amp	am	—	—	mp	a-p	a
2	—	—	mp	amp	am	—	—	amp	a-p	a-p
3	—	—	mp	amp	am	—	—	amp	a-p	a-p
4	—	—	mp	amp	am	—	—	amp	a-p	a-p
5	—	—	mp	amp	am	—	—	amp	a-p	a-p
6	—	—	mp	amp	am	—	—	amp	a-p	a-p
7	—	—	amp	amp	am	—	—	amp	a-p	a-p

Spinulation:

	Ventral					Dorsal				
	C	t	P	F	T	C	t	P	F	T
8	—	—	amp	amp	am	—	—	amp	a-p	a-p
9	—	—	amp	amp	am	—	—	amp	a-p	a-p
10	—	—	amp	amp	am	a	—	amp	a-p	a-p
11	—	—	amp	amp	am	a	—	amp	a-p	a-p
12	—	—	amp	amp	am	a	—	amp	a-p	a-p
13	a	m	amp	amp	am	a	—	amp	p	a-p
14	a	m	amp	amp	am	a	—	amp	p	p
15	a	m	amp	amp	a	a	—	amp	p	—

15 VaC is duplicated on the right leg.

48. *Lithobius asperatus* L. Koch

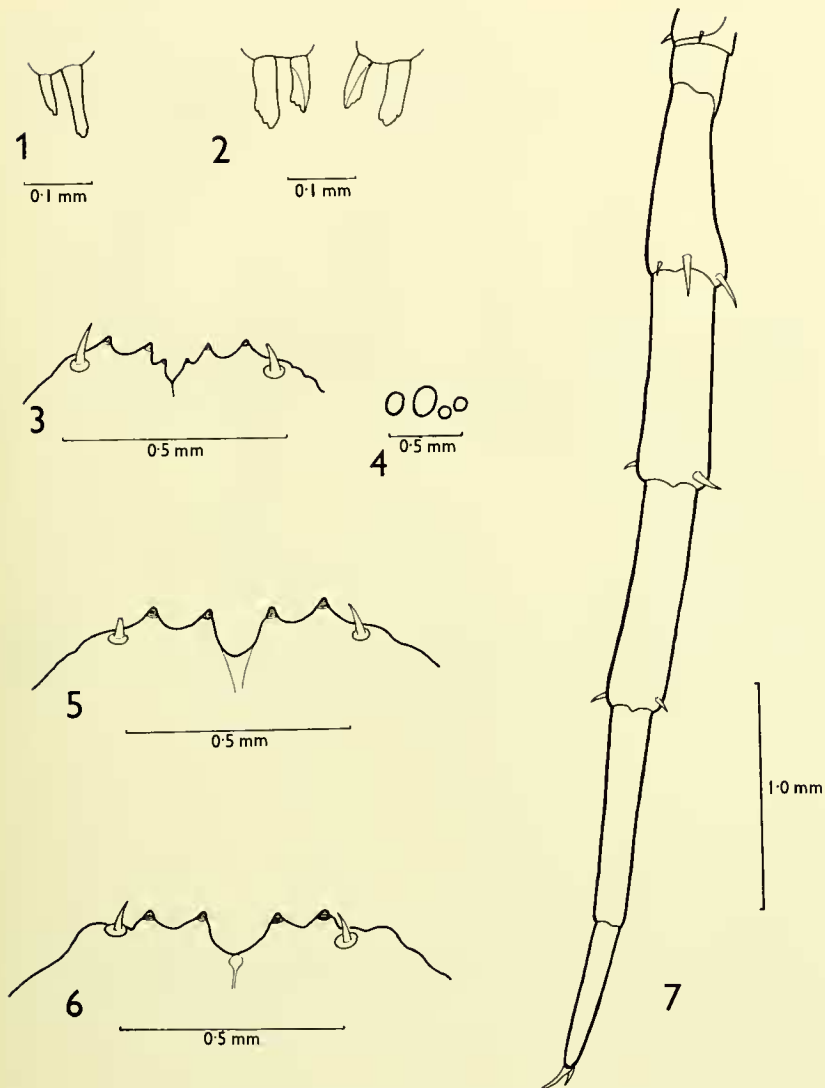
Lithobius asperatus L. Koch, 1878 : 788.

TYPE LOCALITY. Japan.

REMARKS. *L. asperatus* was originally described from specimens belonging to a collection made by Dr. Albrecht von Roretz which has not been traced. There is, however, no doubt as to the identity of this species which is very common in Japan and much of eastern Asia and whose life-history has been studied in as much detail as that of any species of Lithobiidae (Murakami, 1958).

L. asperatus has been redescribed by Haase (1887) from the Phillipines and by Attems (1909) from Japan. Chamberlin (1920) considered that Attem's description, which gave 13 ocelli (Koch gave 23, Haase gave 19 to 23) and a ventral spine on the 15th tibia (neither Koch nor Haase gave this spine), applied to another species with fewer ocelli and more spines which he named *Bothropolys spinosior* on the basis of Attem's description. But specimens in the British Museum (N.H.) from Japan (Reg. no. 1937.9.9.55) and southeast Korea (Reg. no. 93.3.27.6) have 24 and 22 ocelli respectively and in both, the spinulation of the 14th and 15th legs is exactly as described by Attems: there is therefore no correlation between the number of ocelli and the spinulation, and *B. spinosior* is not a valid species. Another of Attem's descriptions of *L. asperatus*, based on a single male from the Hawaiian Islands (Attems, 1903), was questioned by Chamberlin (1920) with more justification: this Hawaiian specimen had very deficient spinulation compared with the typical *L. asperatus* and Attems himself had already referred it to a separate species, *Bothropolys maluhianus* (Attems 1914): but Chamberlin, who cannot have read Attem's later paper, renamed it *B. oahuanus*.

L. asperatus belongs to the genus *Bothropolys* Wood as emended by Chamberlin (1925a) who divided the genus into *Bothropolys* s.str. and *Poropolys*, the former with and the latter without posterior projections on T.6 and 7. In *B. asperatus* the projections on T.6 are very feeble and were not even mentioned by Koch in his original description, while those on T.7, though distinct in some specimens, are so feeble in the example from Japan in the British Museum (N.H.) that one cannot say to which of Chamberlin's subgenera it belongs: *Poropolys* should therefore be disregarded.



FIGS 1-7. Fig. 1. *L. agilis*, spurs of left gonopod of neotype, ventral. Fig. 2. *L. erythrocephalus*, spurs of gonopods of neotype, ventral. Fig. 3. *L. alpinus*, dental margin of prosternum of holotype, ventral. Fig. 4. *L. sulcatus*, ocelli of lectotype. Fig. 5. *L. lucifugus*, dental margin of prosternum of holotype, ventral. Fig. 6. *L. carinatus*, dental margin of prosternum of lectotype, ventral. Fig. 7. *L. piceus*, left 15th leg of female (Franconian Jura), dorsal.

TABLE I

Nominal species	Date	Type locality as published	Designate type material	Validity and status	Generic classification
<i>ariginosus</i> L.K.	1862	Nuremberg district	Lectotype (Franconian Jura)	valid	<i>Lithobius</i> (<i>Monotarsobius</i>)
<i>agilis</i> C.L.K.	1847	Bavaria	Neotype (Mögeeldorf [Nuremberg])	valid	<i>Lithobius</i> s. str.
<i>alpinus</i> L.K.	1862	Seiseralpe [Italian Tyrol]	Holotype	non <i>L. alpinus</i> Heer, 1845 = <i>L. lucifugus</i> var. <i>latzei</i> Verhoeff, 1935. Syn. nov.	
<i>asperatus</i> L.K.	1878	Japan	—	valid	<i>Bothropolys</i>
<i>bucculentus</i> L.K.	1862	Munich district	—	= <i>L. tricuspidis</i> Meinert, 1872. Syn. nov. (see p. 126)	
<i>calcaratus</i> C.L.K.	1844	Germany	Neotype (Nuremberg)	valid	<i>Lithobius</i> s. str.
<i>carinatus</i> L.K.	1862	Greece	Lectotype	valid = <i>L. macrops</i> Karsch, 1888	<i>Lithobius</i> s. str.
<i>cinnamomeus</i> L.K.	1862	Germany	Syntypes (Happurg [Franconian Jura])	= <i>L. muticus</i> C. L. Koch, 1847	
<i>communis</i> C.L.K.	1844	Germany	—	= <i>L. mutabilis</i> L. Koch, 1862 (see p. 110)	
<i>coriaceus</i> L.K.	1862	Germany	Syntypes (Franconian Jura)	= <i>L. forficatus</i> (Linn. 1758)	
<i>crassipes</i> L.K.	1862	Nuremberg district	Lectotype (Franconian Jura)	valid	<i>Lithobius</i> (<i>Monotarsobius</i>)
<i>curtipes</i> C.L.K.	1847	Bavaria	Neotype (Nuremberg)	valid = <i>L. (Monotarsobius) baloghi</i> Loksa, 1947. Syn. nov.	<i>Lithobius</i> (<i>Monotarsobius</i>)
<i>dentatus</i> C.L.K.	1844	Germany	Neotype (Nuremberg district)	valid	<i>Lithobius</i> s. str.
<i>erythrocephalus</i> C.L.K.	1847	Bavaria	Neotype (Happurg [Franconian Jura])	valid	<i>Lithobius</i> s. str.
<i>festivus</i> L.K.	1862	Garmisch [Bavaria]	Syntype	= <i>Eupolybothrus grossipes</i> (C. L. Koch, 1847)	

Nominal species	Date	Type locality as published	Designate type material	Validity and status	Generic classification
<i>forcificatus</i> var. <i>villosus</i> L.K.	1862	Bavarian Alps	Holotype	= <i>L. forcificatus</i>	
<i>fossor</i> L.K.	1862	Grützig (near Nuremberg); Ehrenbürg (Franconian Jura)	Syntypes	= <i>L. piceus</i> L. Koch, 1862	
<i>glabratus</i> C.L.K.	1847	Bavaria	—	= <i>L. melanops</i> Newport, 1845	
<i>granulatus</i> L.K.	1862	Unknown	Holotype	= <i>L. lucifugus</i> L. Koch, 1862. Syn. nov.	
<i>grossipes</i> C.L.K.	1847	Triest	Holotype (Idrija [Yougoslavia])	valid	<i>Eupolybothrus</i> s. str.
<i>hortensis</i> L.K.	1862	Nuremberg; Landstuhl (Rhine-land Palinate)	Syntypes	= <i>L. forcificatus</i>	
<i>immutabilis</i> L.K.	1862	Germany	Syntypes (Nuremberg)	= <i>L. dentatus</i> C. L. Koch, 1844	
<i>impressus</i> C.L.K.	1841	Algerian coast	—	valid	<i>Eupolybothrus</i> (<i>Allopolybothrus</i>)
<i>inermis</i> L.K.	1856	Malaga [Spain]	—	valid	<i>Lithobius</i> s. str.
<i>itoralis</i> L.K.	1867	Tinos [Aegean Archipelago]	Holotype	valid	<i>Eupolybothrus</i> s. str.
<i>lubricus</i> L.K.	1862	Nuremberg district	Syntypes	= <i>L. calcavatus</i> C. L. Koch 1844	
<i>lucifugus</i> L.K.	1862	Bolzano [Italy]	Holotype	valid	<i>Lithobius</i> s. str.
<i>macilentus</i> L.K.	1862	Nuremberg; Franconian Jura; Bolzano [Italy]	Lectotype (Grützig [Nuremberg])	valid = <i>L. aulacopus</i> Latzel, 1880 Syn. nov.	<i>Lithobius</i> s. str.
<i>melanocephalus</i> C.L.K.	1862	Ehrenbürg (Franconian Jura)	Syntypes	= <i>L. melanops</i>	
<i>minimus</i> L.K.	1862	Germany	—	<i>nomen dubium</i>	
<i>minutus</i> C.L.K.	1847	Bavaria	—	= <i>L. mutabilis</i> (see p. 118)	
<i>montanus</i> C.L.K.	1847	South Tyrol	—	= <i>Eupolybothrus grossipes</i>	
<i>mondax</i> L.K.	1862	New Orleans [U.S.A.]	—	valid	<i>Neolithobius</i>

Nominal species	Date	Type locality as published	Designate type material	Validity and status	Generic classification
<i>muscorum</i> L.K.	1862	Germany	Holotype = <i>L. forficatus</i>		
<i>mutabilis</i> L.K.	1862	Germany	Lectotype (Franconian Jura)	valid	<i>Lithobius</i> s. str.
<i>muticus</i> C.L.K.	1847	Bavaria	Neotype (Franconian Jura)	valid	<i>Lithobius</i> s. str.
<i>nigripalpis</i> L.K.	1867	Tinos [Aegean Archipelago]	Holotype	valid = <i>L. piceus bulgaricus</i> Verhoeff, 1925. Syn. nov.	<i>Lithobius</i> s. str.
<i>parisiensis</i> L.K.	1862	Paris	—	= <i>L. forficatus</i>	
<i>piceus</i> L.K.	1862	Garmisch [Bavaria]	—	valid	<i>Lithobius</i> s. str.
<i>pubescens</i> L.K.	1867	Tinos [Aegean Archipelago]	Lectotype	subspecies of <i>L. carinatus</i> L. Koch, 1862. Comb. nov.	
<i>punctulatus</i> C.L.K.	1847	Triest	—	<i>nomen dubium</i>	
<i>sordidus</i> L.K.	1862	Munich district	—	= <i>L. piceus</i>	
<i>sulcatus</i> L.K.	1862	Nuremberg	Lectotype (Grütz [Nuremberg])	valid = <i>L. microps</i> ; Verhoeff, 1931? (non Meinert, 1868)	<i>Lithobius</i> (<i>Monotarsobius</i>)
<i>transmarinus</i> L.K.	1862	New Orleans [U.S.A.]	—	valid	<i>Neolithobius</i>
<i>trilineatus</i> L.K.	1862	Bahia [Brazil]	Syntype	= <i>L. forficatus</i>	
<i>varius</i> C.L.K.	1847	Bavaria	—	<i>nomen dubium</i>	
<i>velox</i> L.K.	1862	Landstuhl (Rhineland Palinate); Franconia; Vienna district	Syntypes	= <i>L. melanops</i>	
<i>venator</i> L.K.	1862	Ehrenbürg (Franconian Jura)	Holotype	= <i>L. melanops</i>	

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